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TENTH ANNUAL REPORT

OF THE

INSPECTOR OF MINES

OF THE

STATE OF MONTANA

FOR THE

YEAR ENDING NOVEMBER 30th, 1898.

JOHN BYRNE, Inspector of Mines.
FRANK HUNTER, Deputy Inspector.

HELENA, MONTANA:
INDEPENDENT PUBLISHING CO
STATE PRINTERS AND BINDERS

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To His Excellency, Hon. Robert B. Smith, Governor of Montana:

Sir:—Pursuant to Section 558 of the Political Code, I have the honor to submit herewith the tenth annual report of this department, embracing condition of mines and accidents in same for the year ending November 30, 1898; also the commendable report of Deputy Inspector Frank Hunter.

Respectfully submitted,

JOHN BYRNE,
Inspector of Mines.

Mine Inspector's Report.

This has been a year of progressive prosperity to the mining interests. Fewer suspensions have occurred than for many years past, and most of those closed down have done so but temporarily. On the other hand, many famous producers have again resumed active operations. Among such the most noteworthy are:

The Granite Mountain and Bi-Metallic mines, which have lain idle for the past five years; the Katy, owned by the Boston & Bay State Mining company, situated at Basin, after being closed down for several years on account of the destruction of the hoisting plant and shaft by fire, commenced the erection of a smelter of 150 tons capacity, a concentrator of five hundred tons and the sinking of a new working shaft, all of which is being pushed to completion as rapidly as the character of the work will permit; the Hope, also situated at Basin, changed owners during the year, and the new company has resumed operations under an active and competent management.

In the list of recent discoveries which have developed into handsome paying mines the following deserve mention:

The Big Seven, situated on Snow Creek, some seven miles from Neihart, must be given first place; the Mayflower and its extension, the West Mayflower, in Madison county, the Gray Eagle and B. & G., in Jefferson county, the Cruse mine, in Lewis and Clarke county, and Nancy Hanks and Shamrock mines, in Granite county, all of which should now be considered as among the permanent producers. The result of the developments carried on during the past year clearly prove these veins to be both valuable and permanent.

The Butte district was never more active than in the year now closed. The Green Mountain mine is now below the 2,000 feet mark, while several others are approaching it. The era of deep mining has arrived, bringing in its train new problems and increased responsibilities to the mine managers. The system which has been adopted and practiced for many years by the leading producers, viz., that of maintaining large ore reserves, enables them to calculate to a certainty for several years ahead and minimizes the elements of chance in the expenditures and provisions made for the future. During 1897 and 1898 the Anaconda company has equipped a number of its principal shafts with massive deep mining engines capable of developing these mines to a depth of five thousand feet. Many of the other operators, I am informed, have under contemplation plans and are doing the preliminary work necessary to equip their respective mines for deeper work. The intense activity displayed in and upon the mines affected the city and general community in like manner, as seen in the large number of handsome and substantial structures erected, besides the large expenditures for permanent public improve-

ments. Indications early in the season pointed to a decreased output by some of the large concerns, due in part to litigation, and on account of a large portion of two of the leading producers having to close through the discovery that a fire which had been smoldering for years, and which the mine officials thought had been extinguished, was still burning. The inconvenience and delay attending the construction of new plants has also been a serious handicap; so much so that the Anaconda company has not hoisted any ore for several months. The reports received for 1897 and 1898, coming from those affected by the causes named, shows but a very slight decrease and warrants the belief that with the removal of those causes we may expect a large increase in production for the coming year, many more men employed, and in general a year of great prosperity for the greatest mining city on earth.

The coal mining industry has exceeded all expectations in its march of progress. Carbon county has fully justified the name bestowed upon it by its founders. The first vertical shaft of any considerable depth has been sunk at Carbonado, under the supervision of Mr. Henry Burrel. Nine hundred feet of hard sand stone had to be penetrated before the coal was encountered. The Gebo mine, located in the outcrop of the same vein as that at Carbonado, and some ten miles distant, passed into the hands of Johnson & McCarty, of Chestnut. A strong company has been organized to operate the property and the summer devoted to erecting buildings for an electric power and haulage plant, the first of its kind in the state. Messrs. Johnson & McCarty's long and intimate acquaintance with the industry, as well as their thorough knowledge of business conditions, assures the success of the new enterprise. In the same field, and presumably on the same measure, is the Bridger mine, nine miles distant from Gebo. The mine has been developed under the direction of Mr. T. P. McDonald and Mr. Walter Cooper. A slope prospects the measure to a depth of eighteen hundred feet. Branch railways were started to the several mines during the summer and are now rapidly approaching completion. Regular shipments may be looked for by the first of January, 1899. Another coal field which has sprung into prominence is Trail creek, situated in Park county. A railway is now under construction to tap this rich field. At Sand Coulee prospecting and all new work was stopped in the early part of the year, operations being confined to working out the reserves opened up in former developments. Within a year Sand Coulee will be abandoned, when all work will be transferred to the new camp of Stocket, six miles from Sand Coulee, the mines of which, though recently opened, are amply prepared to meet the demands made upon the older mine. At Belt a large amount of new territory has been explored, adding greatly to the visible supply and assuring a bright future for this thrifty camp. The miners and the company suffered a severe loss through the destruction of the washing plant and bunkers by fire, on April 15, entailing a loss of \$125,000 and depriving of employment those engaged in the manufacture of coke. A large force of mechanics are at present engaged in rebuilding the plant, which, when completed, will add at least one hundred men to the present working force. A strike lasting two weeks occurred at the Rocky Fork mines

in the month of June. The difference arose over the collecting of the checkweighman's wages in the office. Both the manager, Dr. Fox, and the superintendent, Mr. William O'Connor, were absent when the strike was ordered. Upon their return the matter was quickly and amicably settled. On September 24th a fire occurred which destroyed the tippie, weigh office, car loader, two fans and buildings, besides 100 feet of snow sheds and a number of mine cars. In three weeks the damage was temporarily repaired and the mine started. The Montana Coal & Coke company's mine and coking plant, situated at Aldridge and Horr, changed ownership and management in the month of June. A party of New York capitalists acquired the interest of the Conrad Brothers. With the single exception of the slight misunderstanding at Red Lodge, no trouble or contention arose during the year to disturb the harmony and pleasant relations existing between employer and employee. Freedom from disturbance and strife is a distinct characteristic of the mining industry of this state. In comparing our condition, in this respect, with other states from whence tales of riot and bloodshed are being regularly brought to our attention, the wisdom of the policy pursued by the men who have directed capital, on the one hand, and those who have guided labor's forces, on the other, is commendable in the highest degree. Actuated by a common purpose, these forces have worked in unity for a quarter of a century and have builded a great and enduring industry. It is to be hoped that the factors which built this grand industry from nothing to its present proportions will continue, as in the past, to promote its growth, each recognizing the other's right to an equitable share of the reward. To the various mine officials, with whom my duty brought me in contact, I desire to return my thanks for the assistance and courtesies extended.

CAGES.

In my previous report I commented on the law requiring the enclosing of hoisting cages, stating that good reasons existed for the leniency and indulgence exercised up to that time, and that arbitrary enforcement without practical demonstration of its feasibility might strengthen the prejudice against the device, but that steps had then been taken to secure the observance of the law. On the 19th day of November, 1897, I personally served notice on the general manager of the Anaconda Mining company, stating therein that unless said law was complied with by January 1, 1898, complaint would be filed with the county attorney of Silver Bow county, as provided by law. The law not being complied with within the time specified above, Mr. Frank Hunter, deputy inspector, and myself, called at the office of the county attorney of Silver Bow county on the 18th day of January, 1898, and there informed him of the violation of this law and of my desire to make affidavit to a complaint which would take the matter into court. He informed us that it was impossible to draw up the complaint then, as he had first to ascertain who were the proper parties to be named therein, assuring us on his own account that the matter would receive prompt attention and that I might at any time expect a notice to appear at his office to make the necessary affidavit. Hearing nothing concerning the case for five months, and realizing

that it was the duty of the county attorney and myself to enforce this law, regardless of its merits or demerits, I called upon him again on the 23d day of June, at which time he assured me that the complaint would be ready on the 27th day of the same month, and, using his own language, "from then on the case would be vigorously pushed." Needless to say, it was not prepared by the 27th nor by the 30th, on which date I had another interview with him. While I regret to report to your excellency a failure to enforce a law so important and beneficial, the above statement will show that it was through no want of endeavor on the part of this department. The following petition relative to this law was received by me from the employes of the Anaconda, Never Sweat and Mountain Con mines:

"Mr. John Byrne, State Mine Inspector, Helena, Montana.

"We, the undersigned, practical miners, having given the safety doors on hoisting cages, as provided by law, a fair trial, hereby enter our protest against the same as being a source of danger to our lives. We are convinced from experience that any device of this kind on a hoisting cage is a serious detriment and adds additional chances to the danger of mining, and we hereby petition you to use your good offices towards the repeal of the law governing the same, and your petitioners will ever pray."

Four hundred and fifty signatures accompanied this petition. In reply to this petition, I desire to say that another year's careful observation of the practical workings of this device has the more fully convinced me of its merits, and in my opinion, a fair and impartial trial will not fail to disabuse the minds of my petitioners of the prejudice against the device, as expressed in the above petition, and convince them to their own satisfaction of its efficacy as a protection to life and limb.

ACCIDENTS.

By referring to the appended table it will be seen that fewer fatalities occurred during the present year than for the years 1896 and 1897. The decrease is better illustrated in the percentage of casualties to the men employed than by the difference in the number of accidents. Next to caves and falls of rock and coal, explosions are the most prolific source of accident, and yet it is the source which can best be regulated. The storage and preparation of powder, for use, is receiving much greater attention than formerly from the mine officials, as seen in the absence of explosions of magazines and thawing apparatus. Believing that a better knowledge of the properties of this dangerous mixture, with the safest method of handling it, would make the practical miners more careful and decrease the accidents from this cause, I addressed Capt. W. R. Quinan, Superintendent of the California Powder Works, and received from him the following notes on the handling of powder, which contain many valuable hints to the superintendent as well as the practical miner.

NOTES ON HANDLING OF DYNAMITE.

Storage.—Dynamite should be stored in a cool, dry place. Nitro-glycerine

is a liquid with a high boiling point, but it evaporates sensibly at temperatures a little above the normal. At a temperature of say 100 F. the loss is serious in proportion to the time of exposure. In this way the powder may be much weakened. In a damp place it will absorb moisture, and if it is stored for any length of time it will be spoiled.

Thawing.—Probably two-thirds of the fatal accidents that have happened with dynamite have come from careless methods of thawing. Dynamite freezes about 45 F. In this condition it is stiff and hard and should not be used for blasting, as it is insensitive to the ordinary detonator. The powder is a poor conductor of heat and for this reason it freezes and thaws slowly. The time required to thaw it thoroughly when it is once solidly frozen is much greater than most people think. Shut up in the boxes in a magazine, it will remain frozen even in summer for many weeks.

The thawing of dynamite is always attended with danger if it is done rapidly at a high temperature. The danger is in direct proportion to the temperature. No matter how urgent the haste may be, the temperature used should never exceed 100 F. A dry heat should be used—that is, the powder should not be brought in direct contact with hot water or steam. Water tends to make the nitro-glycerine exude and also attacks the chemical salts in the composition. Where the object justifies the expense it is a good plan to keep the exterior of the magazine at a moderate temperature, say 60, which will prevent the powder from freezing.

Steam pipes should never be used inside of a building where powder is stored. The best method of heating is the well-known hot water system used for dwellings. In this the circulation is active and the arrangement such that the water cannot be brought to the steaming point or even be over-heated. It has been found that a maximum temperature of 104 degs. in the water gives an active circulation. The heater is located at a safe distance and the water circulates through pipes in the building and returns to the heater. The pipes outside the building are well protected and covered to prevent loss of heat and the building should be made as impervious to heat as possible.

Double walls, floors and ceiling with a sawdust filling answer every purpose, but the building must be made absolutely tight. A crack under a door or window will counteract the best heating system that can be made.

If steam is available a very cheap and efficient system of heating a small building is as follows: On the outside of the building a sheet iron drum is set up and connected with another inside. Two pipes pass through the wall connecting the drums near the top and bottom. The outside drum is set a little lower than the other to provide for the overflow of the water. The holes through the walls are packed around the pipes with waste or tow. Water in the outside drum is heated by a small steam pipe and circulates through the drums. The room is kept warm by the radiation from the inside drum. If the building is tight and properly insulated, the amount of steam necessary is very small. To prevent the vapor from making the room damp, the drums are closed on top with wooden lids covered on the under side with cloth soaked in paraffine. The sheet iron drum

used for the transportation of glycerine or coal oil is well suited to this work.

When dynamite is being used in winter on a large scale, as at a mine, it would pay to build a small thawing room of this kind, say 12x16. The powder needed for the day's consumption could be carried in and left for twelve hours or more, the boxes being simply opened or the powder taken out and put on shelves, depending upon the time available. A temperature of 75 or 80 deg. maintained during the night would suffice to thaw the powder. A thermometer should always be consulted to regulate the temperature of the room, which should not exceed say 85 deg.

This particular arrangement for a thawing room is convenient but it may be varied to suit the case. The essential feature is a tight, heat-insulated room kept at a moderate and regulated temperature.

The plan of a thawing room is much better than using thawing stoves. The best of these are liable to get out of order, if not originally dangerous. The thawing room has great capacity, so that the work need not be done in a hurry and has always this advantage over a small apparatus. Any excess of temperature brings discomfort to the operator and so gives warning. A room in which a man can work without distress is reasonably safe for thawing dynamite.

In no case should any apparatus for thawing powder be used in a magazine or building where a large quantity of powder is stored. The same warning applies to the handling of caps in the preparation of primers.

Charging.—In charging a drill hole use a wooden tamping rod. If the hole is dry, cut the cartridges into short lengths and slit them along the sides so that when driven down with the rod the powder will spread and fill the inequalities of the hole. The primer with the cap carefully attached should be put in last—that is, on the top of the charge. The hole is then to be filled and tamped with care. Earth or clay mixed with gravel makes one of the best tamplings. In a wet hole leave the cartridges intact for the better protection of the powder. The water which surrounds the cartridges will transmit the blow to the rock, but use tamping in every case. Some miners do not think it necessary, but it is the only way to get the best results. The powder gases tend to act in the line of least resistance. If this work is not properly done a part of the energy will be expended through the open drill hole or in blowing out a weak tamping before the gases have done their work on the rock.

There are two reasons for putting the cap at the top of the charge. If it is buried in the mass of the charge, the fuse in burning down to it may set fire to the powder by side spitting and burn up a part of it before the cap explodes. The other reason is this: the detonation is not instantaneous. It begins at the cap and moves by a wave or impulse through the powder. The detonation proceeds in lines radiating from the cap, and the greatest effect is in the direction of the greatest dimension of the powder. As a bottoming effect is usually required, the best place for the cap is at the top of the charge.

Powder Gases and Ventilation.—The gases given by an explosion should be

colorless and invisible. The visible smoke consists of solid products formed in the reaction and of dust made by disintegration of the rock. The best gases are those of a complete detonation. To insure this strong detonators should be used, the powder should be in good condition and the charging should be done with care. It is very essential that the cap should be in actual contact with the powder.

It should be kept in mind that the gases given by the best powder are irrespirable. Carbonic acid is the characteristic gas, the physiological properties of which are well known. Carbon monoxide is produced by some powders and this even in small quantities is an active poison. The danger incurred in going into a drift where a charge has been recently fired depends chiefly upon the ventilation. If the ventilation is poor the air in the drift is already impoverished. The oxygen is deficient and the addition of even a small amount of irrespirable gas may turn the scale and make the air dangerous to life. This effect is more marked in mines at great elevation above the sea level, because owing to the lightness of the air the amount of oxygen in the cubic foot is smaller than the normal."

I have strongly condemned the use of wooden boxes for thawing and have succeeded in many instances in securing the adoption of a hot water thawer instead.

RECOMMENDATIONS.

I would recommend the amending of House Bill No. 17, Session Laws of 1897, which provides for an opening independent to the main working shaft or incline, so as to make its main provisions applicable to all mines which are worked through a tunnel or drift opening, and prohibiting the erection of any but a fire proof building within 30 feet of all drift or tunnel entrances which have no escapement, or other means of egress.

Section 705, Penal Code, providing for safety apparatus, in so far as it relates to the use of safety cages, when a greater depth than three hundred feet has been attained, is very defective and should be remedied. The change I would suggest would make the law read as follows:

Section 705. It is unlawful for any corporation or person to sink or work through any vertical shaft, or any incline shaft, having an inclination of 70° or more, to a greater depth than 300 feet, unless said shaft shall be provided with a cage or skip, said cage or skip to be provided with an iron bonnet and safety catches, to be used in the lowering and hoisting of the employes thereof, said cage to be also provided, etc., as the remaining part of the section provides.

The rate of speed at which employes are lowered into and hoisted out of shafts should be regulated by law. The maximum rate should not exceed 700 feet per minute, except in shafts where the cages are provided with doors, when a rate of 800 feet per minute may be safely allowed.

Deputy Inspector Frank Hunter in his report points to the necessity of legislation regulating the use of crossheads. The danger arising from their use was also noted in the reports of Mine Inspector C. S. Shoemaker, for the years 1894 and 1895. A long experience with their use and the risks attending their operation, leads me to concur in the views expressed by the

gentlemen quoted, and to request the enactment of a law which will prohibit the use of crossheads of less than seven feet in length.

The tables covering the production of gold, silver, copper and lead for the years 1896 and 1897, together with the tabulated statement of Montana's mineral production and yearly increase from 1862 to 1897, inclusive, are taken from the report of Mr. Eugene Braden, assayer in charge of the United States Assay Office, for which data I wish to extend my thanks.

The precious metal output of Montana during 1897 was the largest in the history of the state, and aggregated \$53,954,675.03. This is \$3,222,576.90 more than that of the preceding year. The total production was contained in the four metals, gold, silver, copper and lead. The quantities and values of each are shown for these two years in the table below:

Metals.	1896		1897	
	Quantity.	Value.	Quantity.	Value.
Gold, fine ounces .	211,914.961	\$4,380,671.00	217,514.846	\$4,496,430.92
Silver, fine ounces	15,720,022.44	*20,324,877.49	16,807,346.06	*21,730,710.03
Copper, pounds . .	232,096,483	25,356,540.77	237,158,540	26,798,915.02
Lead, pounds	22,521,340	670,009.87	25,794,974	928,619.06
		\$50,732,099.13		\$53,954,675.03

*Coinage value.

Production of gold, silver, copper and lead in the State of Montana from the year 1862 to 1897, inclusive:

Years.	Gold.	*Silver.	Copper.	Lead.	Totals.	Yearly Inc. %
1862-81	\$200,000,000	\$11,000,000	.....	.....	\$211,000,000	..
1882	2,550,000	4,370,000	1,539,860	.....	8,459,860	..
1883	1,800,000	6,000,000	3,452,960	326,424	11,479,384	37 ½
1884	2,170,000	7,000,000	5,386,500	246,326	14,802,826	31
1885	3,400,000	11,500,000	6,779,800	274,350	21,954,150	50
1886	4,422,000	13,849,000	5,761,200	494,132	24,526,332	12
1887	5,978,536	17,817,548	8,853,750	607,662	33,257,496	35 ½
1888	4,200,253	15,790,736	15,103,946	569,160	35,664,095	7 ½
1889	3,500,000	19,393,939	13,334,970	456,975	36,685,884	3
1890	3,300,000	20,363,636	16,656,437	675,392	40,995,465	11 ½
1891	2,890,000	20,139,384	14,377,336	1,229,027	38,635,757	d5 ½
1892	2,891,386	22,432,323	19,105,464	99,035	45,419,208	18
1893	3,576,000	21,858,780	16,630,958	964,089	43,029,827	b
1894	3,651,410	16,575,458	17,233,718	730,551	38,191,137	11
1895	4,327,040	22,886,992	21,114,869	754,360	49,083,261	28 ½
1896	4,380,671	20,324,877	25,356,541	670,010	50,732,099	3 ½
1897	4,496,431	21,730,710	26,798,915	928,619	53,954,675	6
Totals	257,533,727	273,033,393	217,487,224	9,817,112	757,871,456	

*Coinage value. d—Decrease.

The tables showing Montana's coal output from the year 1883 to 1897, inclusive, are taken from the report of the U. S. Geological Bureau.

Counties.	Number	Product.	Value.
	Mines.	Tons.	
Cascade	5	1,040,783	\$1,999,104
Choteau	4	2,495	12,340
Gallatin	2	130,913	223,024
Park	6	21,189	294,072
Carbon	5	239,478	368,868
Totals	22	1,434,858	\$2,897,408

The average number of days worked in the mines of each county, the average price per ton received for coal, and the average number of employes, was:

Counties.	No. days	No.	Av. price
	active.	employes.	ton.
Cascade	269	1,491	\$1.76
Choteau	193	30	2.55
Gallatin	286	181	1.68
Park	191	301	2.30
Carbon	219	334	1.48
Totals	252	2,337	\$1.76

The output in short tons since 1883 and the value of the output for the last eight years has been:

Year.	Ton.	Value.
1883	19,795	.....
1884	80,376	.....
1885	84,444	.....
1886	49,846	.....
1887	10,202	.....
1888	41,467	.....
1889	363,301	.....
1890	517,477	\$1,252,492
1891	541,861	1,228,630
1892	564,648	1,330,847
1893	892,309	1,772,116
1894	927,395	1,887,390
1895	1,504,193	2,850,906
1896	1,543,445	2,279,672
1897	1,647,882	2,897,408

The average price per ton for coal by counties producing ten thousand tons or more during the past nine years has been:

Year.	Carbon.	Cascade.	Gallatin.	Park.
1889		\$2.04	\$2.38	\$2.86
1890		2.03	2.31	2.73
1891		2.00	2.38	2.43
1892		2.00	2.50	2.64
1893		1.76	2.34	2.31
1894		1.94	2.43	2.16
1895	\$2.11	1.72	2.07	2.01
1896	1.80	1.34	1.98	1.58
1897.....	1.47	1.76	1.68	2.39

The average value per ton for the state was: 1889, \$2.42; 1890, \$2.42; 1891, \$2.27; 1892, \$2.36; 1893, \$1.99; 1894, \$2.04; 1895, \$1.89; 1896, \$1.47; 1897, \$1.76.

The following table shows the number of men employed in coal mining during the various years:

Year.	Cascade.	Gallatin.	Park.	Carbon.
1890	379	120	705	...
1891	401	139	562	...
1892	426	146	565	...
1893	634	151	568	...
1894	1,165	153	408	...
1895.....	1,341	235	260	309
1896	1,505	306	164	310
1897	1,491	181	301	316

The average number of men employed in the entire state has been: 1890, 1,257; 1891, 1,119; 1892, 1,158; 1893, 1,401; 1894, 1,782; 1895, 2,184; 1896, 2,335; 1897, 2,337.

The average number of days worked by the mines in each county was:

Year.	Cascade.	Gallatin.	Park.	Carbon.
1892	298	298	241	...
1893	278	278	240	...
1894	184	265	198	...
1895	235	245	197	194
1896	247	180	280	225
1897.....	269	286	191	226

The following exhibits the production of coke and the value thereof for the year ending June 30, 1898:

	Value.
Tons produced	69,499 \$521,242.50

The following exhibits the number of mines inspected, number of men employed and the number of fatal and non-fatal accidents during the last six years:

Year.	Mines in- spected.	Men em- ployed.	Fatal acci- dents.	Non-fatal acci- dents.	Total acci- dents.	Per cent. to No.
						employed.
1893	56	5,312	29	4	33	.62
1894	78	7,082	27	19	46	.65
1895	88	8,758	41	18	59	.67
1896	78	7,727	64	21	85	1.10
1897	130	9,825	52	29	81	.82
1898	136	11,096	48	29	77	.69

FATAL ACCIDENTS.

No.	Name.	Date.	Mine.	County.	Cause.
1	Jerry Buckley	Dec. 6, 1897	Never Sweat	Silver Bow	Fell from cage
2	John McCarthy	Dec. 7, 1897	Bell	"	Cave
3	Chas. D. Lemon	Jan. 3, 1898	Leonard	"	Blast
4	John F. Sullivan	Jan. 4, 1898	Anaconda	"	Suffocation
5	M. C. Fiaherly	"	"	"	"
6	Benj. Sener	Jan. 8, 1898	Pennsylvania	"	Blast
7	Geo. Hatherall	Jan. 30, 1898	Blue Jay	"	Struck by cage
8	C. J. Sundberg	Feb. 24, 1898	Belt	Cascade	Blast
9	Pat. Coughlin	Apr. 18, 1898	Anaconda	Silver Bow	Fell in chute
10	Morgan G. Johns	May 28, 1898	Belle of Butte	"	Fall of rock
11	Ervin Davis	June 23, 1898	Bridger	Carbon	Drowning
12	Jacob Boomala	July 9, 1898	Sand Coulee	Cascade	Fall of slate
13	Colman Tierney	July 23, 1898	Bell	Silver Bow	Blast
14	Richard William	Aug. 2, 1898	Gray Rock	"	Cave
15	Hugh Friel	Aug. 4, 1898	Chestnut	Gallatin	Fall of coal
16	James Wedge	Aug. 10, 1898	Drum Lummon	Lewis and Clarke	Broken stall
17	Andrew Rosetti	Aug. 19, 1898	Original	Silver Bow	Rope broke
18	John Connolly	Aug. 21, 1898	Parnell	"	Fell from cage
19	Frank Sando	Aug. 26, 1898	Alice	"	Crushed
20	Joseph Kosma	Sept. 9, 1898	Ruby	Jefferson	Cave
21	Harry Andrews	"	"	"	"
22	Patrick Healey	Sept. 11, 1898	Never Sweat	Silver Bow	Fall of rock
23	L. P. Hagman	Sept. 21, 1898	Minah	Jefferson	Explosion
24	Wm. Gilronan	Oct. 11, 1898	St. Lawrence No. 3	Silver Bow	Steam
25	W. C. Flynn	"	"	"	"
26	Wm. A. Waller	Oct. 12, 1898	Silver King	"	Crushed
27	Andrew Richter	Oct. 19, 1898	Stewart	"	Fall of rock
28	Emil Flankey	Oct. 20, 1898	Otisco	"	Crosshead fall
29	Herman Keikkila	"	"	"	"
30	C. R. Molen	Oct. 22, 1898	Mountain Con	"	Cave
31	Jabez Shovell	Nov. 4, 1898	Belmont	Lewis and Clarke	Hitch gave way
32	John Fister	"	"	"	"
33	James Boyd	Nov. 11, 1898	Gold Coin	Deer Lodge	Cave
34	Thomas Rutter	Nov. 12, 1898	Belle of Butte	Silver Bow	Suffocation
35	Robert McFadden	Nov. 15, 1898	Berkley	"	Blast
36	John Kinno	Jan. 20, 1898	Yellowstone	Mcagher	Fell down shaft
37	Martin Nopens	Mar. 8, 1898	Sand Coulee	Cascade	Fall of coal
38	John Benze	Apr. 15, 1898	Leiter	Madison	Explosion
39	Andrew Aro	Apr. 20, 1898	Sand Coulee	Cascade	Fall of coal
40	Ed. Enfonger	Apr. 30, 1898	Cruse Mine	Lewis and Clarke	Walked into shaft
41	Thos. Hallihan	May 9, 1898	Hope Mine	Jefferson	Explosion
42	Chas. Lunden	June 29, 1898	Drum Lummon	Lewis and Clarke	Asphyiated by gas
43	Dominick Poletto	Sept. 22, 1898	Original	Silver Bow	Cave
44	John J. Neary	Sept. 16, 1898	Green Mountain	"	Explosion
45	John F. Neary	"	"	"	"
46	Wilbur Diller	Sept. 17, 1898	Bowery Mine	Madison	"
47	John Morn	Sept. 21, 1898	Diamond	Silver Bow	Crushed
48	Robert Fairful	Nov. 8, 1898	Sand Coulee	Cascade	Fall of coal

NON-FATAL ACCIDENTS.

No.	Name.	Date.	Mine.	County.	Cause.
1	Dennis Harrington	Dec. 30, 1897	Mountain Con No. 1	Silver Bow.....	Injured by blast.....
2	Oxley Johnson.....	Jan. 3, 1898	Leonard.	"	"
3	C. A. Beaton	Jan. 13, 1898	Gold Coin.....	Deer Lodge	Lost an eye by drilling, missed hole.....
4	Victor Erickson ...	"	"	"	Lost an eye by drilling into missed hole . .
5	Emil Larson.....	"	"	"	Lost an eye by drilling into a missed hole ...
6	John Lowney	Jan. 20, 1898	Bell.	Silver Bow.....	Leg broken by cave....
7	Jerry Melton	Jan. 28, 1898	Mountain Con No. 1	"	"
8	Eugene Pence	"	"	"	Internal injuries by fall of rock
9	Dan O'Rourke.....	Feb. 4, 1898	Bell.	"	Leg broken by cave of rock.
10	Pat. Haunifan . . .	Feb. 26, 1898	Diamond	"	Internal injuries by fall of rock
11	Matt Kobbe.	Mar. 2, 1898	Bell.	"	Leg broken by a cave..
12	David Gibbons....	Mar. 24, 1898	Never Sweat	"	Internal injuries by jumping off cage while in motion.....
13	Thos. McDonald...	Apr. 12, 1898	Middle of the Road	Deer Lodge.....	Two legs broken by falling down shaft...
14	Michael Jasper.....	May 1, 1898	Never Sweat	Silver Bow.....	Internal injuries by falling down a chute.
15	Robert Thomas....	May 28, 1898	Blue Wing	"	Leg broken by a cave..
16	Stephen Foy.....	May 31, 1898	East Gray Rock ...	"	Leg broken by a fall of rock
17	James B. Furay...	June 23, 1898	Blue Jay	"	Arm broken
18	Solmon Tallon	July 12, 1898	Stewart.....	"	Machine drill ran into his neck
19	Thos. F. Quinn....	July 24, 1898	Bell.	"	Two legs broken by a bar falling on him....
20	John Peterson	Sept. 21, 1898	Minah.	Jefferson	Lost an eye by an ex- plosion
21	Joseph Currie	Oct. 26, 1898	Mountain Con No. 1	Silver Bow.....	Leg broken.....
22	Wm. Henderson...	Nov. 15, 1898	Berkley.....	"	Injured by blast
23	Geo. Morgan	"	"	"	"
24	John Kelly	"	"	"	"
25	Dan Shovelin.....	Dec. 9, 1898	Stray Horse.	Broadwater.....	Fall from ladder slight fracture of skull
26	Thos. B. Graves...	Jan. 15, 1898	Comet	Jefferson	Dislocated shoulder and broken ribs. Struck by bucket....
27	Thos. Kane.....	Jan. 16, 1898	Ruby	"	Dislocated shoulder and internal injuries. Caught between car and side of drift
28	John Mullen	May 2, 1898	Electric.....	Park.....	Run over by empty car severely bruised
29	Phil Hoffman.....	Sept. 20, 1898	I. X. L.	Deer Lodge.....	Compound fracture of right leg, severely bruised. Brake slip- ping from drum.....

LEWIS AND CLARKE COUNTY.

The mines which come under the inspection laws in this county are: The Belmont, Cruse, St. Louis and the old reliable Drum Lummon, all situated at Marysville, eighteen miles northwest of Helena; the Daisy, Little Dandy and Old Amber, located at York, twenty-four miles northwest of this point, and the War Eagle, operated at Butler, fourteen miles to the west.

The Belmont is owned by the Penobscot Mining company, of which Mr. John Longmaid is president and J. Henry Longmaid superintendent. A mill has been erected on this old property and is now in operation. The success of the process introduced in this mill will have a marked influence on the mining interests of the Marysville district, as well as on that large area of

territory adjoining, the ores of which are of the same character. The process consists of a combination of amalgamation and cyanide. The quartz after being crushed in the twenty-stamp battery and passing over the plates, in which process 50 per cent of the values contained is saved, is conducted in the form of tailings into large settling tanks, where they are subjected to the action of the solution and practically all the values remaining after passing over the plates liberated. The mine is developed by three tunnels; No. 1 is 500 feet, No. 2 600 and No. 3 1,200 feet. From the level of No. 3 tunnel at its face to the apex of the vein is 360 feet. Between those points large bodies of ore is exposed which can be mined at a moderate cost. An upraise was being made to connect the three tunnels, which will serve for ventilating and escapement purposes.

The Drum Lummon mine, owned by the Montana Mining Company, Limited, has done development work on its shafts, winzes, upraises, drifts and crosscuts aggregating 7,938 lineal feet during the year, in the course of which several large bodies of low-grade ore was uncovered. Both stamp and cyanide mills were operated to their full capacity. The result of the year's work shows a handsome balance. The ventilation of the mine has been improved, connections being made by drifts at points which benefitted the mine in this respect. The safety and comfort of the employes is receiving the usual care and attention from those in charge. On account of the heavy and persistent flow of water on the 1,600, it was found necessary to reinforce the pumping plant by the addition of a 500 gallon per minute Reidler pump. In all other respects the mine is in the same excellent condition as noted in my previous report.

At the Cruse mine, situated at Bald Mountain, the main tunnel was extended 150 feet, making now 1,100 feet. A two-compartment vertical shaft was sunk 110 feet from the level of the tunnel. The Cruse gives promise of developing into a large producer. The fissure is strong and well defined and shows every evidence of permanency. A thirty-five horse-power engine, one-inch steel rope and safety cage comprises the hoisting equipment.

At the St. Louis work has been confined to stoping out the ores discovered in the previous year's development. A new upraise was made since my last report, which has supplied excellent and much-needed ventilation, besides a separate outlet for the miners.

The Daisy mine, owned by T. J. Walsh and others of Helena, is being worked by John Rowand & Company, who have a lease on the property. The mine is developed through two tunnels of 400 and 250 feet in length, respectively. The ore is gold and silver-bearing and occurs in a flat vein between granite and slate. The mine is timbered with tunnel sets and stulls. Ventilation is very good and there are two outlets.

The Little Dandy mine is situated at York and is owned and operated by John Rowand & Company, with John Fletcher as foreman. The vein is exposed for 300 feet of its length by a tunnel and for seventy-five feet on its dip by an incline shaft. The ore and other material is hoisted out of the latter with a whim, five-eighths wire rope and car. Gold is the principal

metal found in the ore. Ventilation is good. A ten-stamp mill is running continuously on the ore furnished from this mine.

At the old Amber mine, at York, a small force of miners, under the direction of Mr. G. M. Kerr, has been engaged during the year in developing this and adjoining claims belonging to the same company. The main tunnels have been extended and several prospecting crosscuts driven. The mine is equipped with a 30-ton Bryan mill.

The War Eagle mine, located at Butler, owned and operated by the Iron Mountain Mining Company, Mr. Robert Hall, manager; Robert Angus, superintendent, and Fred Cramp, foreman, has started active operations during the present year; 100 feet was added to the depth of the shaft, making a total depth of 295 feet, double compartment. The crosscut driven to tap the vein opened up a large body of low-grade ore, which can be mined at a small cost. The proximity of the mine to the railway and smelter and the desirability of the ore for fluxing purposes tend to the success of the enterprise. The shaft is equipped with 6x8 Hendall engine, three-quarter inch round rope and bucket. Ventilation is good. A separate outlet is maintained. The ore is valuable for its high percentage of iron, though it carries a little gold.

Mine.	Number of men employed . . .	Mills.
Drum Lummon	297	110 stamp. 400 ton cyanide mill.
Belmont	45	20 stamp. Tailings treated direct from bat.
Cruse	20	20 stamps.
St. Louis	10	10 stamps.
Daisy	7	
Little Dandy	20	10 stamps.
Old Amber	6	30 ton Bryan mill.
War Eagle	27	
Totals	432	170 stamps.

MADISON COUNTY.

Madison county has shown marked and steady improvement during the year. Capital is commencing to realize the possibilities and inducements held out to intelligently directed effort in the Tobacco Root range. This great gold belt offers opportunities to the miner and investor which are not to be found elsewhere.

In the Clipper mine, located at Pony, managed by Mr. W. W. Morris, with Jas. Rooney as superintendent, work has been principally confined to stoping between tunnels Nos. 4 and 5, besides extending the latter tunnel 300 feet. An upraise was also made connecting these tunnels, which thoroughly ventilates the workings and secures the miners from fire and such other dangers

as are common to mining. From the portal of No. 5 tunnel to its face, a distance of 1,800 feet, a height of 1,400 feet is gained along the dip of the vein. At this depth extensive and high-grade ore bodies have been discovered. Every indication surrounding the fissure gives confidence in the future of the mine with greater depth. The formation is gneiss. The vein dips to the south with a strike east and west. Thirty men are employed at this mine and every reasonable precaution is taken for their safety and welfare.

The Garnet Mining Company, operating the Galena mine, two and one-half miles south of Pony, under the management of C. H. Woods, extended the main working tunnel 200 feet during the year, making it now 1,050 feet. The twenty-stamp mill is operated by water-power, owing to the short supply of which a shut down is necessitated during the winter months. A small force is steadily employed in the mine pushing development work; twenty-four men find employment during the greater part of the year. The mine had received better care than formerly and the safety of the employes decently provided for.

The Revenue mine, the property of the Revenue Gold Mining Company, situated at Richmond Flat, under the management of Mr. Lawrence Harris, has continued to pay handsome dividends to the owners. The ores of the Revenue were the first to be successfully treated by the cyanide process. Since my last report a new upraise was run through to the surface, providing a means of egress for the miners. Thirty men have been constantly employed. The timbering meets all the demands of safety and the ventilation is all that can be desired. The mine has supplied all the ore the 40-ton cyanide mill could treat.

At the Monitor mine, situated at Richmond Flat, managed by S. J. Knox, R. C. Knox superintendent, operations have been carried on during the latter half of the year through a new tunnel 325 feet long. A large section of the vein has been tied up on account of litigation between the Monitor and Revenue companies. I am informed that negotiations are now pending looking to an early settlement of the matters in controversy. The vein dips to the west with a trend northeast by southwest. Formation granite. Seventeen men are employed. The general condition of the mine is good.

The B. & L. mine, situated on Meadow creek, is a new property operated under bond by Messrs. Haywood and Holmes. The mine is not developed to any extent, yet ore bodies of sufficient size have been exposed to justify the erection of a ten-stamp mill, modern in every respect. Eight men have been engaged driving tunnels and in putting the mine in condition to supply the tonnage required to keep the mill in constant operation.

At the Kennet mine, located on the Madison divide, five miles east of Virginia City, W. B. Millard, owner, a 60-stamp mill equipped with all modern appliances, was completed and started operating in January of the present year. In the month of April the road between the mine and the mill became impassable for teams, necessitating a shut down. Operations resumed in

September with from 30 to 40 stamps dropping. Since my last report many improvements have been made in the mine in the interest of the employees. An escapement outlet was made and a safety cage substituted for the bucket, as well as important changes for the better in the system of timbering. Thirty-four men find employment. The formation is eruptive granite. The fissure has an easterly dip with a northerly and southerly strike.

The Lucky Boy mine is also owned by Mr. Millard and is the extension of the Kennet. Developments are carried through a two-compartment shaft, timbered with 10x10 timbers, 250 feet deep, 100 feet of which was sunk in 1898. The hoisting plant consists of a 9x12 Ottumwa engine, 1 1/8 round rope and bucket. Both mines are in charge of Mr. James M. Davey. Eleven men are employed.

At the Easton mine, near Virginia City, from ten to twenty men are employed, the number being regulated by the season. The lower workings of the mine, which are reached by a two-compartment shaft 318 feet deep, was discontinued two years ago. Since then the work done has been confined to stoping out the ores remaining above the tunnel level. This section of the mine has produced a large quantity of high-grade ore during the year. The interests of the men are carefully attended to by the management.

The Leiter mine, situated on Wisconsin creek, eight miles east of Sheridan, is under the management of J. H. Trerise. The working of the old mine was seriously interfered with during the latter part of the present year owing to a heavy flow of water being encountered, causing a suspension for several months. A two-compartment shaft was sunk 180 feet on one of the adjoining claims, opening up an extensive body of ore of fair grade. Forty men have been on the pay-roll. The condition of the mines meets every reasonable requirement of safety.

The Montana mine, located at the head of Wisconsin creek, operated by the Montana Mining Company, Frank Wright, superintendent, has done considerable development during the year, consisting of the running of several shot tunnel and open cuts. A ten-stamp mill was erected during the year. Twelve men are employed. This mine gives promise of developing into a large producer.

Mayflower mine, situated about twelve miles southeast of Whitehall. A two-compartment shaft 300 feet deep was sunk from No. 3 tunnel at a point 500 feet from its entrance. The sinking of this shaft has demonstrated beyond question the continuity of the vein at the greater depth. The quantity and value is fully equal to that found near the outcrop. From the surface to the level of No. 3 tunnel a depth of 130 feet is attained, making a total depth of 430 feet from the outcrop to the bottom of the shaft. Twenty-one miners are employed and all the laws looking to the health and safety of the miners are carefully observed.

The West Mayflower mine, owned by the West Mayflower Mining Company, William Owsley & Company, lessees; E. P. Clark, superintendent. Development consists of a tunnel 800 feet long and a winze sunk under it sixty feet and an upraise to the surface. A station was made to install a gas-

oline engine of 22 horse-power for the purpose of sinking the winze deeper. Sixteen men find employment and their safety and comfort receive due consideration at the hands of Mr. Clark. As its name indicates, the West Mayflower is the extension on the west of its famous namesake.

The Carolina mine, owned by Hoffman & Chisholm, has been a steady producer. Eight miners are constantly employed and the mine regulations are strictly observed.

At the Little Kid mine, located on Old Baldy mountain, seventeen miles from Norris, eight men were employed during the season in extending the tunnel. The twenty-ton Bryan mill was operated part of the time.

Bob Ingersoll mine, owned and operated by Rod D. Leggat, situated on Mill creek, fifteen miles from Sheridan, has a shaft 360 feet deep, sunk on the vein, which dips 45 degs., equipped with a 68 Ottumwa engine, 3-4 round steel rope and car.

The Ore Sulphide, carrying gold with a low percentage of lead and copper. No stoping has yet been done. Besides sinking the shaft the vein was developed for a considerable length with drifts, in the course of which a large tonnage of merchantable ore was made available for extraction the coming year. The mine employs ten miners. In the opening and developing of this property up to this time all the work done is of a substantial and workmanlike character.

The Sunrise mine, owned by the New Sunrise Mining Company, D. S. Reinhardt. This property adjoins the Mayflower on the northeast. A two-compartment vertical shaft was commenced during October. Preparations were being made to place a steam hoist on and continue sinking until 400 feet is attained. Six men are employed.

The Bowery mine, located at Silver Star, owned by F. R. Merk, Berkin & Parrish, lessees. A single compartment shaft 350 feet deep, Fraser & Chalmers engine, three-quarter inch steel rope and skip is the means through and by which the ore and material is brought to the surface. The ore is pyritic iron carrying gold in combination. Six miners find employment. Two exits are maintained providing a means of escape as well as a plentiful supply of pure air.

JEFFERSON COUNTY.

The mining conditions of Jefferson county have assumed a most encouraging aspect within the year. Basin, which has been dull and inactive, has resumed its old-time activity; in fact, the great mineral resources of the county are receiving the recognition from capital which they so richly deserve.

The Elkhorn mine. As a result of close and economical management, this famous old producer has been kept operating and a small profit made for the stockholders. Both mine and mill have operated without interruption, giving employment to 123 men in the several departments. Under Mr. Davey,

the foreman, the safety of the underground workers is given first place in the mine economy.

The Hope mine changed owners and a new company, designated the Basin Gold & Copper Mining Company, assumed control. The executive head of the company is Mr. M. L. Hewett, with Lieutenant-Governor Spriggs as superintendent and John Fogerty foreman. The main shaft is 482 feet deep, 100 feet of which was sunk by the new company. The hoisting plant consists of a 40 horse-power Ledgerwood engine, one-inch round steel rope and single-deck safety cage. The mine is timbered with square sets and stull. The exits are maintained and ventilation is good. Twenty-one men are employed, which number will be increased as the new levels are developed. A 100-ton concentrator erected near the shaft is a very valuable adjunct to the mine.

In the Eva May mine, located on Cataract creek, a large and valuable strike of high-grade ore was made on the 450 feet level. The ore encountered is much more extensive than that in the other parts of the mine. Since the new strike was made the mine and concentrator have been in continuous operation.

At the Overland mine, situated at Montana City, the shaft was lowered to the 400 feet level, a new steam hoist erected and the mine generally improved during the year. Ten men are employed.

At the Liverpool mine, situated at Lump Gulch, a winze was sunk from the bottom level 100 feet, making a depth of 500 feet. In the course of sinking a streak of high-grade ore was encountered which had the effect of renewing interest in this and contiguous mines.

The B. & G. mine is located on Warm Springs creek, seven miles from Alhambra, operated under bond by R. A. Bell. A two-compartment shaft has been sunk to a depth of 250 feet, 200 feet of which was sunk the present year. A steam hoist has lately been placed in position. The ore carries gold, silver, copper and lead. Mr. C. E. Gable, formerly superintendent of the East Pacific, has full charge of operations. The B. & G. promises to develop into one of the big producers of Jefferson county. Twenty-five men are employed and all needful precaution exercised for their safety.

The Katy mine, owned and operated by the Boston & Bay State Mining Company, Alexander Glass, manager; James Glass, superintendent. The erection of the concentrating and smelting plant by this company, now nearing completion, will exercise a material influence over the mining interests of Basin as well as the highly mineralized districts adjacent thereto. Heretofore transportation charges to reduction points have operated as a preventative to the working of the extensive medium grade deposits of those sections. The smelter was especially designed and constructed for economical treatment of this class of ores. Its success will result in the resumption of many mines now idle and the making valuable of numberless prospects now discredited. A new shaft is being sunk on the mine and the vein

opened up so as to supply the large output which will be required to keep the works in operation.

The Ruby mine has assuredly justified the confidence and judgment of its promoters. When bonded, in 1897 the property had been condemned as nearly worthless by mining men whose opinion almost carried conviction. Outside capital was enlisted to develop the property, but from the commencement of operations the mine paid expenses and has now developed into one of the best paying mines for the capital invested in the state. The shaft has been sunk to the 400 feet level and the mill improved by the addition of two Tremain stamps, increasing the crushing capacity and making possible the treatment of the lower grade ores. Twenty-four men are employed and their interests are regarded by the faithful observance of all state regulations.

At the Comet mine nearly all work done during the past year has been close to the surface. Bunches of good carbonate ore was overlooked in past years, from the working of which, besides the recovery by concentration of the ores in the old dump, the lessees have derived a nice profit. Fifteen men are employed around the works.

Gray Eagle, owned by Holmes & Dahlman, located near the head of High Ore gulch, eight miles northwest from Boulder. The developments for the past year consist of the extending of No. 2 tunnel to 700 feet and a driving of a new tunnel started from the base of the hill. At the time of my inspection it was in the hill 600 feet. Twenty-two men find employment and everything necessary to make the mine safe and healthful is done. The development of the past year places the Gray Eagle on the list of permanent producers.

High Ore mine, located in High Ore gulch, six miles northwest from Boulder, owned and operated by the High Ore Gold & Copper Mining Company, B. H. Young, manager. A crosscut tunnel penetrates the mountain for a distance of 1800 feet, from which drifts are driven along the vein. Five men constitute the working force.

At the Minah mine, located near Wickes, fifteen miners are working under lease. Considerable ore has been produced with the promise of a material increase in same for the coming year.

The Concord mine, owned and operated by T. S. Hogan, on the north fork of Clancy creek, is developed by a single compartment shaft 120 feet in depth, from which drifts have been driven along the vein. The ore is a sulphide carrying gold, silver and lead. The Concord promises to develop into a large producer within the coming year. Seven miners are employed.

GRANITE COUNTY.

The consolidation of the Granite and Bi-Metallic interests and the reopening of those mines under one management is one of the most notable occurrences to the mining industry which has transpired for the year. Mr.

Paul A. Fusz, who has been long and intimately connected with these mines, has been entrusted with their management. Associated with him is Mr. Wyrmer Zeigler as superintendent and Mr. James Wyloughby as mine foreman. Both mines are operated through the Bi-Metallic shaft, which is 1,540 feet deep and of three compartments. The hoisting equipment consists of a 22x60 Fraser & Chalmers engine, half-inch steel cable and double-deck safety cages, the latter provided with all the safety apparatus required by law. During the period of suspension a drainage tunnel 8,000 feet in length was completed, which connects with the Bi-Metallic shaft at the 1000 feet level and with the 1460 feet level of the Granite mine. As a measure of mine economy, the driving of this tunnel is undoubtedly a profitable one, as the sum saved in pumping charges will pay a liberal interest on the investment. An aerial bucket tramway transports the ore from the mines to the mill, a distance of two miles. The treatment process comprises stamps, of which there is 100, pan amalgamation and chlorination. One hundred and fifty men are employed at the mine, which number is being gradually increased. The condition in regard to timbering, ventilation and the means providing for escape, in case of emergency, is fully provided for in every instance.

The Nancy Hanks mine, located at Garnet, with the exception of extending the drifts along the vein, has been developed in no other way. Sixteen miners are employed and most of these were engaged in stoping. This mine has been a large and faithful producer and promises to continue to be so in the future. All laws relating to the safety and health of the miners are faithfully observed.

Shamrock mine, located at Garnet, is owned by P. S. McDermott, Lannan Brothers and Patton. The Shamrock is located on the same vein as that of the Nancy Hanks. Thirty-four men find employment. Extensive developments and improvements are under way. A new incline shaft is being made which the management have planned to equip with a hoisting plant capable of going to a considerable depth. A new upraise was put through in conformity with the law, as well as minor changes in the interest of safety. Shipments of high-grade ore have been regular for the past year, and with the better facilities the production will be largely increased.

The Lead King mine, situated at Garnet, owned by Mitchell & Mussigbrod, Dr. Mussigbrod, manager; Maj. Hornbrook, superintendent. A new tunnel was driven from the base of the mountain to prospect the vein at greater depth. An incline winze was being sunk from the tunnel, upon which it was proposed to place a steam hoist and develop the mine to greater depth. Alterations and improvements were made in the ten-stamp mill, with the object of better adapting it to the ores of those mines. The mine furnishes employment to fourteen men.

The Red Cloud mine, owned by Mitchell & Mussigbrod, adjoins the Lead King, operated under lease by Senator Connolly and others. A tunnel develops the vein for 400 feet. Eight men are employed. Considerable ore of fair quality was produced during the year. In this mine there is extensive deposits of medium class ore, which, owing to the high transportation

charges to Butte and East Helena, the nearest smelting points, cannot be profitably mined.

The International mine, located at Garnet, owned by Mitchell & Mussigbrod, Williams & Parker, lessees, under the supervision of Mr. L. C. Parker. A well-timbered two-compartment shaft was sunk 148 feet on this property, as well as a large amount of crosscutting and drifting. The shaft is equipped with an 8x10 Ledgerwood engine, five-eighths rope and bucket. Thirteen men are employed.

The Hope mine, located at Philipsburg. This is one of the oldest mines operating in the state. The extent and permanency of the mineral lodes of this district is best shown by the almost continuous operation of this mine for thirty years past. Besides running the mill to its full capacity, the development of the tunnels, winzes, drifts and crosscuts have been actively prosecuted. Thirty-six men are employed and all the laws respecting their welfare are being strictly complied with.

The True Fissure mine, located near Philipsburg, owned and operated by the Hope Mining company, of St. Louis. N. B. Ringling, superintendent; Henry Rehfeldt, foreman. Six men are employed driving a tunnel which has attained the length of 700 feet. The ore is silver-bearing sulphide.

The Royal Gold mine, owned by the Royal Gold & Silver Mining Company, H. S. Neal, lessee and manager. The mine is developed through two tunnels. The mill has been in operation the greater part of the year, and has turned out a considerable quantity of the yellow metal. Twenty men are employed.

The Hobo mine, located at Hasmark, owned by Hynes & Lynch, Joe Tamietti, lessee. The vein is developed by two tunnels. No. 1 is in 600 feet and No. 2 500 feet. From the latter a shaft is sunk 100 feet. The ore is galena carrying high silver values. Seven men are employed. Several improvements were recommended in the mine.

BROADWATER COUNTY.

At the Stray Horse mine operations have been suspended on the main part of the mine during the last half year, pending the completion of a new tunnel, now being driven, and which has advanced 600 feet. Everything in and about the old and new works is done in the usual substantial and workmanlike system. Forty-four men were employed, which number was reduced temporarily and will be reinstated as the new development progresses.

The Webster mine is situated three miles from Winston, and is owned and operated by Robert Whyte. A drift opening develops the mine for a distance of a hundred and thirty feet. The value is chiefly gold. Seven miners find employment. The condition of the mine meets all lawful requirements.

The Iron Age mine, located within three miles of Winston, owned by H. B. Hill and W. S. Dodge. Several short tunnels are driven on the vein.

Twenty miners operate the mine under lease and during the year made regular shipments of high-grade ore.

The Custer mine, located near Winston, owned by Mr. Charles P. Clark, Harry P. Clark, manager. This property has been operated under a leasing system introduced by Mr. Clark. The vein has a very slight dip and is prospected by drifts. Thirty-two miners have been leasing on sections of the mine let to from two to four men, with very satisfactory results to both parties to the contract.

Keating mine, located at Radersburg, owned by J. A. Keating. The mine is developed through a two-compartment shaft 300 feet deep, equipped with a twenty-five horse-power Ledgerwood engine, five-eighths rope and bucket. A five-stamp mill is in constant operation on ores furnished from this mine. Seven men are employed. There are two exits. Timbering is well done and ventilation excellent. The ore is pyrites of iron carrying a fair gold value.

The Diamond Hill mine, owned by the Diamond Hill Gold Mining Company, Neil Cochrane, manager. Forty of the 120 stamps have been in operation for the past four months, principally in carrying on experiments and determining the adaptability under varying conditions of the process to the ores. Twenty-nine miners are employed.

CASCADE COUNTY.

The rich mining districts of Neihart and Barker were segregated from Meagher county and annexed to Cascade by an act of the Fifth Session of the Legislature. By the addition of this district Cascade now becomes one of the leading mineral producing counties of the state.

The Big Seven mine, located on Snow creek, seven miles from Neihart, owned and operated by the Big Seven Mining Company, D. L. Barker, manager. During the year the main working tunnel has been extended to 1,400 feet, and a long upraise made for ventilation and escapement. The mine is timbered throughout with sets and stulls. The Big Seven has the advantage over all other mines of the district in which it is located in the higher gold values contained in its ores. In fact, this value alone would make the ore profitable. Fifty men are employed.

The Queen mine, located at Neihart, owned and operated by the Queen Mining & Milling Company, Andrew Nelson, manager. Operations were resumed about the commencement of the year and developments actually prosecuted. A two-compartment shaft is sunk to a depth of 300 feet. On the shaft there is a Holter 7x10 friction engine, three-quarter inch rope and safety cage. The ore is silver-lead, shipments of which have been regular since resumption. A new upraise was under way from the 300 to the 100 feet level, there to connect with an outlet leading to the surface. A force of twenty-three men are employed.

The Florence mine, situated at Neihart, A. M. Henry, manager; Daniel Lenney, superintendent. In addition to maintaining the regular production

Nos. 1 and 2 tunnels have been extended along the vein, with results altogether satisfactory to the future of the mine. The ore reserves were materially increased and the productive boundaries considerably enlarged. The ore is a silver-bearing sulphide containing a low percentage of lead. Forty men are constantly employed and to the credit of the management the condition of the mine secures to them immunity from danger in so far as the dangerous character of their avocation can be controlled.

The Broadwater mine is now operated by leasers, who are reworking many of the old stopes and prospecting blocks of ground which the company considered unprofitable. Forty miners are at work.

Tiger mine, situated at Barker, owned by the Lorrento Mining Company, Steve Pierce, lessee. Operations are carried on through a tunnel 500 feet in length. There are two exits and ventilation is very good. The ore is galena. Ten men are employed. The mine had been closed down, resuming operations about a week previous to my visit.

Wright & Edwards mine, located at Barker, owned by the Block P. Mining Company, Barton Sewell and George Gunn, lessees. This is the largest lead producer operating in the Barker district. The mine is developed by a two-compartment shaft 200 feet deep. A tunnel 750 feet long connects with the shaft at the 100 foot level. A neat hoisting plant, consisting of a thirty horse-power Griffith & Wedge engine, seven-eighths steel rope and bucket is in use at the mine. A force of twenty-seven men are constantly employed.

The Moulton mine, situated at Barker, owned by the Miller Mining Company, of Milwaukee, F. C. Miller, manager. Development consists of a shaft 110 feet in depth, then idle, and a tunnel which was being driven to tap the vein at a depth of 350 feet from its apex and which had then advanced 1,200 feet into the mountain. The ores of the Barker district are galena, carrying medium silver values. A force of twelve men are regularly employed.

DEER LODGE COUNTY.

The Bald Butte mine and forty-stamp mill have been in steady operation for the year. Development is in advance of production by at least two years. Considerable new ground was explored by drifts and crosscuts which resulted in adding another productive section to the mine. An average force of fifty men have been employed and all laws designed for their safety are strictly observed.

The Prize mine, situated at Granite Butte. Operations at this mine have been confined to stoping. The mine furnishes ore in sufficient quantity to keep the ten-stamp mill continually dropping. Twenty-five men are employed; ventilation is excellent. A new upraise was made during the year for the further benefit of the men.

Mammoth mine, located at Coloma, owned by the Mammoth Gold Mining Company. A two-compartment shaft develops this mine to a depth of 270

feet. The shaft is equipped with an 8x14 Kendall engine, one-inch steel rope and a safety cage. There is an escapement outlet from the 150 feet level to the surface, but none from the 150 level to the lower workings. Notice was served upon the manager to comply with the law relative to a second outlet. Fifty men were employed. (Note.—I later learned that this mine closed down about September 1.)

Ontario mine, located fifteen miles from Elliston. This mine resumed operations late in the present year, having been bonded by Hon. T. E. Collins and Mr. W. J. Clark. A force of twenty-five men has been engaged in repairing the damages resulting from several years of a suspension and actively developing the mine, preparatory to supplying the output required to keep the concentrator in operation.

FLATHEAD COUNTY.

The Snow Shoe mine, eighteen miles south of Libby, is now owned by the Pacific Northwest Mining Corporation, Limited, Howard C. Walters, manager; D. P. Bowers, superintendent. This property was successfully operated up to July 20, under lease by Mr. D. P. Bowers, at which date it was transferred by purchase to the Pacific Northwest Mining Corporation. Extensive improvements are contemplated in both mine and concentrator, assuring a large increase from this mine of the metals contained in the ore, which is gold, silver and lead. Some improvement was needed in the timbering of the mine, which was recommended; in all other respects the mine was in good condition. Thirty-two miners were employed.

Keystone mine, located at Sylvanite. This mine has been further developed by a new crosscut tunnel 500 feet in length, which gives an added depth of 230 feet on the dip of the vein. Work on the old portion of the mine has been suspended and confined to developing at the greater depth acquired by the new tunnel. A force of twelve miners are employed.

Th Gold Flint mine, situated at Sylvanite, J. D. Farrell, manager; T. J. Moffet, superintendent. In January a twenty-stamp mill was completed and commenced operating upon the ores of this mine. The only development done during the year was that of extending the drifts on the vein. Thirty-three men are employed at the mine, the condition of which was satisfactory.

MEAGHER COUNTY.

At the lead camp of Castle all the mines which were producing last year have either suspended or have been turned over to leasers, and in this way considerable ore is being produced.

RAVALLI COUNTY.

The Curlew mine, situated near Victor, is operating under lease. Twelve men are working in the various portions of the mine, which is producing some ore.

The White Cloud mine, at Pyrites, was operated in the early part of the year by Clark and Wheeler, who, failing to make a success of the property, abandoned it.

COAL MINES.

In the brief review devoted to the coal mines given in the introductory to this report, I feel that sufficient mention of the mines specially named have been made as to their progress during the year. Besides those mentioned there was also operating the Chestnut mine, at Chestnut; the Cokedale mine No. 2, at Cokedale; the Electric mine, near Horr, and the Montana Coal & Coke Company's mine at Aldridge. The condition of those is so similar to that noted in my last report that I feel to enlarge on them further would be superfluous. In conclusion, it is but fair to state that the various managements of the coal mines have within the last year exercised a reasonable care and diligence in the interest of the health and safety of their employes. In only two instances have I reason to complain of an insufficient and poor quality of air, viz: at Sand Coulee, in the east side of the mine, the air is at times poor, resulting from the debris which falls in the air courses on the withdrawal of the pillars; and at Aldridge, owing to the distance and circuitous route the air has to travel, it becomes impregnated with dust and is sluggish by the time it reaches the east end of the mine, which is on the return of air course. Previous to my last visit of inspection the superintendent had commenced a new and shorter air course, which when completed will furnish a plentiful supply of air to the place affected as well as improve the ventilation throughout the mine. In all other respects the workings are in good condition.

FATAL ACCIDENTS.

On January 20, John Kinno, a carman, met with death by falling from the 100 to the 200 foot level of the Yellowstone mine, near Castle. At the time the accident occurred he was preparing to lower the bucket trucks down to the 200 foot level, where he was then going to send up rock. Instead of putting down the platform over the hoisting compartment, which is the rule where buckets are used for hoisting rock, he put down but half of it, leaving the other half of the compartment open. In some manner, while placing the truck in position to tie to the cable, he either stumbled or walked backwards into the open half of the compartment, the truck going down with him. When picked up by G. W. Terry life was extinct.

Martin Nopens, a miner working for the Sand Coulee Coal Company, at

Sand Coulee, met with injuries of so serious a nature on March 8 that after lingering until April 22 death relieved him. On the date of the injury he was mining under a large piece of coal, which had been shook and somewhat displaced by a blast. After working under it for some time he heard it crack and attempted to get from under it, but was not quick enough. The mass, weighing about a ton, fell while he was in a stooping position, rupturing him so badly that a cure could not be effected. The accident occurred in room 11-2, 3d butt, entry 13 south.

On April 15 John Benze, a miner employed at the Leiter mine, was instantly killed by an explosion of powder, on the south side of the 300 feet station. The victim being the only person working on this level at the time the explosion occurred, leaves to conjecture the cause of the disaster. The circumstances attending it would indicate that Benze had gone to the magazine for powder to blast some holes which he had drilled, first securing the necessary fuse and caps from the north side of the station, where they were separately stored, and crossing the shaft to the magazine south of the shaft for the powder. He evidently had procured what powder he needed and was starting from there when the explosion occurred. I am of the belief that when leaving the magazine Benze carried the powder in one hand and the fuse, with caps attached, and lighted the candle in the other, and unknown to him the flame of the candle came in contact with the caps, exploding them, they in turn exploding the powder. It is due to the officials in charge of the mine to say that all reasonable precautions are taken in the storing and care of explosives. Judging from the effects produced, I do not think that there were more than from three to four pounds of powder in the magazine.

Andrew Aro, at Sand Coulee, on April 20, received injuries which terminated fatally on May 1. The victim was employed as a loader and was filling a car with coal when a large chunk which was loose and had been lying against the pillar rolled out striking him, breaking his hip and evidently inflicting internal injuries. This was his second shift in the mine and probably the work was somewhat new to him, else he could not have received the injuries in so simple a manner.

Ed. Enfanger, a driver employed in the Cruse mine, near Marysville, sustained injuries of such a severe character, at about 1:30 p. m. of April 30, that death ensued the following morning. Four hundred feet from the portal of the tunnel a crosscut is driven in the hanging wall and some twenty feet in this crosscut a two-compartment shaft is being sunk. At the intersection of the crosscut and tunnel, a throw switch is placed which is arranged to allow the cars to either continue in the tunnel or enter the crosscut leading to the shaft by the adjusting of a short rail. On resuming work after dinner Enfanger and his partner, having in charge a mule and two cars, entered the tunnel, Enfanger leading the mules, his partner following in the rear of the cars. When the junction of the tunnel and crosscut was reached Enfanger turned into the crosscut, though their destination was the end of the tunnel, and walked straight into the shaft, falling on the bonnet of the cage,

a distance of 45 feet. He must have been from two to three feet in advance of the mule, otherwise the animal and cars would have gone down with him. The testimony given at the inquest by the other employes as to the position the switch was in and as to the condition of the switch and shaft respecting light, was very conflicting. I am, however, satisfied that the switch was placed by some one in the position for the entrance of the cars on the track leading to the shaft, and while there may have been a candle burning near the shaft, it was not sufficient to provide the necessary light where an open shaft is maintained, and where, as in this place, a dense fog was produced by the water falling from the roof upon the steam pipe leading down the shaft. From the conflicting nature of the evidence the coroner's jury was unable to determine who was responsible for the accident.

Thos. Hallahan was instantly killed at the Hope mine, Basin, by an explosion of powder in the magazine on the 100 foot level on the morning of May 9th. The victim was one of the shaft crew and was engaged in dumping the bucket and running away the rock while his partners were filling in the bottom of the shaft. At about 1:30 a. m. Oscar Nelson came up and informed Hallahan that all the loose rock was cleaned up and he was going to prepare charges to blast seventeen holes. Hallahan volunteered to assist him. Nelson proceeded to cut the fuse and the other went to the magazine and brought out seventeen sticks of powder to the station near which the caps and fuse were stored. After making up the primer both men went again to the magazine to get the balance of the powder required. Upon examining the powder it was found that it was not sufficiently thawed for use. They then determined to go to supper, thinking that in the interval it would soften. Hallahan, as a precautionary measure, took the seventeen primers, which he had placed in a candle box, back to the magazine, and then returned to the station. Nelson stepped on the cage and asked him to get aboard and descend to the bottom for their partners and all go to supper together. This he refused to do, saying that he did not want to get wet, but that he (Nelson) should call for him coming up. Nelson rung the cage to the bottom and took his partners on board and gave the 100 foot signal. The cage had not proceeded more than forty feet up the shaft when they heard the explosion. Just before reaching the station it was found that the door had been closed by the concussion. Chas. Meyers climbed to the station to investigate and found Hallahan at the back end of the station with a piece of 10x10 timber seven feet long lying on top of his body.

The magazine was located sixty feet from the end of the station in the east drift, and was heated with steam, and at the time of the explosion contained, according to the statements of the other men, about 35 pounds of powder. The miners employed in the mine were unanimous in the opinion that the location, construction and method of heating the magazine fulfilled all the reasonable demands of safety. It is my opinion that the explosion was caused by the flame of the candle igniting the wrapping of the fuse at the time Hallahan carried the box of primers back to the magazine, and that

this spark communicated itself to the powder in the fuse, and further, that he became aware that something was burning and started in the drift to investigate, being in the drift probably twenty feet when the explosion occurred, which hurled him back with terrible force to the station. The coroner's jury returned a verdict exonerating the company.

Charles Lunden, a miner employed at the Drum Lummon mine, Marysville, was asphyxiated by gas in an upraise which was being made from the north drift of the 900 foot level to connect with the 800 foot level. On the afternoon of June 29th, Lunden and his partner, William Chynoweth, drilled five holes with a powder drill and blasted them at 10:45 a. m., expecting to break through to the 800 foot level. Chynoweth positively asserted that the hose was placed in a secure position and at a point which in his judgment was most favorable for dissipating the gas by the compressed air, and upon descending to the level after igniting the fuse he opened the valve to its full extent, turning the full pressure of air into the upraise. After dinner at about 1:15 p. m., Lunden left his partner on the station, awaiting drills, and started for the upraise. Some thirty minutes later Chynoweth reached the upraise and called to Lunden. Receiving no answer he climbed up and found him entangled in the hose and insensible. He evidently had fallen with the hose some twenty feet, as his candle was that distance above him and still burning. Chynoweth, and two others that responded to his cries for assistance, were overcome by the gas in attempting to take Lunden down to the drift, but they recovered shortly after reaching the pure air. Every effort was made by the company doctor to revive Lunden. I am of the opinion that some rock from the blast rolled on the hose, bending it back, thus preventing the free passage of the air, and that when Lunden ascended to the upraise he attempted to take the hose to the top of the raise and was overcome in the act. The coroner's jury returned a verdict exonerating the company from blame.

On September 12, a cave occurred in the Original mine, at Butte, on the east side of the 1000 foot level, which extended in length seventy-five feet east and west, and as near as could be determined, some twenty feet in height. When the cave occurred Dominick Poletto, an Italian, with three comrades, was working on the fifth floor driving east. The ground had been settling on and crushed the timbers for the greater part of the afternoon, and at 4 o'clock p. m., so great was the squeeze that the miners working on the fourth, fifth and sixth floors, including Poletto and his partners, retired to a place of safety. After remaining out thirty minutes Poletto and some others returned to their respective places of work, while several of the more cautious refused to return and warned their comrades of the danger. At 5:10 p. m. the ground commenced to crush and break the timbers, and in less than three minutes the great mass had fallen and settled to the fourth floor, burying Dominick Poletto beneath it. The body was not recovered until the 18th. The place where the cave occurred was timbered with 10x10 square sets, and these strengthened with the same size angle braces. Several of the miners testified to having warned Poletto, and one witness did so in his

own language. My opinion is that the victim when the warning was given tried to collect and take out with him the tools he and his partners were using. When found the body was fifteen feet from the place he was last seen working, and near it a wheelbarrow and some tools. The coroner's jury returned a verdict of unavoidable accident.

On the morning of September 16, John J. and John F. Neary met with a horrible death caused by an explosion on the 1800 foot south crosscut of the Green Mountain mine. They had finished charging twelve machine holes, at 6:30 a. m., using seven feet of fuse for each hole. The fuse used by this company is Evas double-taped water tight safety fuse, and timed under guarantee to burn one foot in thirty seconds, thus allowing them three minutes and thirty seconds in which to spit the twelve holes and retire to a place of safety. When all was in readiness both men commenced igniting the fuse, each selecting those that he would spit. Some of the fuse would not take fire, owing to the exposed and loose powder getting damp, and this, I am of the opinion, necessitated a fresh cut being made in that fuse for the purpose of exposing dry powder. Eleven of the holes exploded. The first of them as John J. Neary was in the act of spitting the 12th and last of the number, and the one which remained unexploded. This conclusion I reached from the fact that his body was close to the drift, while the body of John F. was some twenty-five feet from there. A relative of the men testified to the length of the fuse as given, and also to the fact that the length of time elapsing between the explosion of the first and the remainder of the holes was only such as would be made by the difference in the time of igniting the separate fuses, thus eliminating all doubt as to any of the fuses burning quicker than another. The coroner's jury returned a verdict of miscalculation of time.

On September 17, in the Bowery mine, at Silver Star, Wilbur Diller was instantly killed by an explosion caused by him tamping powder in a drill hole with an iron scraper. He had eight sticks of powder lying in the bottom of the drift, having several holes to charge. The explosion occurred as he started to load the first hole. Dropping half a stick of powder in he commenced tamping it with the scraper. The iron scraping along the rock, which contains pyritic iron, generated a spark, which exploded the powder in the hole and the shock from that exploded the eight sticks in the drift.

On September 21, John Mowrn met with a frightful death at the 1,000 foot station of the Diamond mine. At the time of the accident he was on his way to the surface. The station tender placed him on the top deck of the cage and signalled the engineer to hoist the bottom deck into the chairs. The statements of the station tenders are to the effect that after the signal was given Mowrn attempted to step from the cage and was prevented from doing so by one of them pushing him back, at the moment the cage was hoisted in answer to the signal. Mowrn's head must have projected over the vertical line of the outer edge of the cage. The distance to be hoisted was but nine feet, but in that distance the platform or deck on which Mowrn was standing

came level with the top station wall plate, with a distance of but three inches between, and in this space Mowrn's head was caught. The jury returned a verdict of accidental death.

On November 5, an accident of a very sad character occurred to Robert Fairful, a boy of eighteen years of age, in the Sand Coulee mines, at Sand Coulee. The father, Thomas Fairful, and two sons, Robert and Willie, were working in Room 4, off first east parting. Robert was filling a car and his father and brother were standing close by, while several of their fellow-workmen were in the immediate vicinity, having gathered there from their respective places to take lunch together. Robert had just stepped from his companions to finish loading the car, when suddenly, and without warning, a large slab of top coal fell from the roof, striking him and knocking him against the car, his chin stopping on the cross-bar which supports the door. His injuries were so serious that death came three days later, on the 8th. Seven witnesses, including the boy's father, agree in the statement that the accident was unavoidable.

NON-FATAL ACCIDENTS.

Dan Shovlin, shift boss at the Stray Horse mine, near Winston, received a slight injury to the skull and some minor bruises, on December 9, 1897, by slipping from a ladder and falling a distance of 114 feet.

Thos. B. Graves had his shoulder dislocated and some ribs broken at the Comet mine, January 15, 1898, by being struck by a descending bucket as he was climbing the shaft.

Thos. Kane, at the Ruby mine, on January 18, was internally injured and had his shoulder dislocated while entering the tunnel by being squeezed against the side at a narrow place by a loaded car which was coming out.

At Electric Peak mine, near Horr, Park county, John Mullen was run over by an empty car which he and his partner were taking down the slope. The accident occurred on the night of May 4. The injuries consisted of badly bruised limbs and body.

Phil Hoofman, at the I. X. L. mine, Coloma, on September 20 sustained a compound fracture of the right leg, besides severe and painful bruises as a result of the brake slipping on the whim as he was descending the shaft in the bucket. The shaft is 125 feet deep. The whim and break worked as usual for about half the depth, when suddenly it started on its downward course, striking the bottom with sufficient force to inflict the injuries mentioned.

Butte, Montana, November 30, 1898.

Mr. John Byrne, State Mine Inspector, Helena, Montana.

I herewith submit my second annual report for the fiscal year ending November 30, 1898. •

The list of mines which I have inspected is also submitted, together with suggestions made after careful consideration. I have avoided going over the same ground as published in the last report, in the matter of the equipment and general working of the mines.

The report also embraces the fatal and non-fatal accidents which I have investigated.

Trusting that the report will be acceptable to you and meet with the approval of his Excellency, the Governor, I have the honor to be,

Your obedient servant,

FRANK HUNTER.

Deputy Mine Inspector's Report.

GENERAL REMARKS.

The Butte district continues to maintain its proud position as the greatest mineral producing section of the world. During the year now closing, the development work in the district exceeded that of all previous years by many hundred feet, and shaft development is in progress at the date of this report in nearly all of the large copper properties. The shaft development of the year in the Butte district amounted to more than 8,512 feet. The total number of men employed in and about the mines in Butte is 7,348.

Chief among the achievements of the year in the mining progress of Butte was the development of the Green Mountain shaft to a depth of 2,100 feet, making it the deepest vertical shaft in Montana. During the year there was also a lateral drift or drain tunnel driven from the 1600 foot level of the High Ore to the Buffalo, a distance of 4,315 feet, running east and west, with crosscuts to the Bell, Green Mountain and Mountain Con. The water from the latter properties will flow through boxes or flumes constructed in the crosscuts and tunnel to the High Ore, through the shaft of which it will be pumped to the surface.

SAFETY APPLIANCES.

Safety appliances on cages are in general use at all the mines of the Butte district, and are generally tested each week. In my opinion there is room for great improvement in safety appliances. Many of the claws are made with small teeth and are invariably placed too close to the guides. I believe they should be placed at least seven-eighths of an inch back from the guides. By being too close, the action of the cage permits them to wear on the guides and the teeth get dull. I also believe that larger teeth would give better results, for I find that where they are small, when the rope breaks the slimy matter that usually attaches itself to all guides in mines, allows them to slip, thus precipitating the cage to the bottom of the shaft. With the teeth large and kept sharp, I believe they would grip better and thus prevent many accidents.

CALL BELLS.

In my last annual report I recommended electric flash light signals for call bells in mines where electric lights are used. They are a great improvement over the old system of electric bells, which get out of order frequently. The flash light system can be installed at a small cost in mines where electric lights are used. I am pleased to report that the Boston & Montana mines adopted the system at my suggestion and that the management is well pleased with the same.

CROSSHEADS.

I believe some law should be enacted to make changes in crossheads or abolish them entirely. They should be made longer. At present they are made so light that the least obstruction in the shaft holds them up when there is no clamp on top, and when released fall, frequently causing fatal accidents. Where shafts are being developed there is generally no clamp on top, but they should be so constructed that this danger could be avoided.

THE ANACONDA COMPANY.

The mines operated by the Anaconda Copper Mining Company, of which Marcus Daly is general manager, were the Bell, Diamond, High Ore No. 2, Mountain Con. Nos. 1 and 2, Buffalo, Green Mountain, Anaconda, St. Lawrence Nos. 1 and 3, and Never Sweat. The company employs 3,336 men in and about the mines. The ore is copper, with silver and gold as bi-products.

The Bell.—James Higgins is superintendent and Edward Maguire foreman. The shaft is down 1,650 feet, of which 150 feet was sunk in 1898. It has three compartments. There are thirteen exits. The ventilation is good. This mine and the Diamond employs 490 men underground, 80 topmen and 6 engineers.

The Diamond.—James Higgins is superintendent and John McGuiness foreman. The shaft is down 1,700 feet, of which 500 feet was sunk in 1898. It has two compartments down to the 1000 foot level and three compartments from that down. There are twelve exits and the ventilation is good.

The High Ore.—Wm. Skyrme is superintendent and John Ferns foreman. Employs 46 men underground, 35 topmen and three engineers. The main shaft is down 1,600 feet and has three compartments. A new hoisting engine, 30x72, built by the Union Iron Works, has been put in place during the year 1898. There are five exits. The ventilation is good.

The Mountain Con. Nos. 1 and 2 and the Buffalo employ 620 men underground, 80 topmen and six engineers. James Keegan is superintendent and Joseph Nevin foreman.

The Mountain Con. No. 1 is 2,000 feet deep, of which 600 feet has been sunk in 1898. It has three compartments. There are seventeen exits. The ventilation is good. Sinking is still in progress.

Mountain Con. No. 2.—The main shaft is down 1,600 feet, of which 100 feet was sunk in 1898. It has three compartments. There are eleven exits. The ventilation is good.

The Buffalo.—The shaft is down 1,600 feet, of which 600 feet has been sunk in 1898. It has three compartments. At the present time it is worked through the Mountain Con. No. 2, and is used as an air shaft on the west side. The ventilation is good.

Green Mountain.—James Keegan is superintendent and James Brennan foreman. Employs 255 men underground, thirty-five topmen and three engineers. The main shaft is down 2,100 feet, of which 500 feet has been sunk in 1898. It has three compartments and is the deepest vertical shaft in Montana. There are ten exits. The ventilation is good.

The Anaconda, Never Sweat and St. Lawrence Nos. 1 and 3 employ 1,425 men underground, 240 topmen and twelve engineers. John O'Neill is superintendent of this group.

The Anaconda.—Tim Lynch is foreman. The main shaft is down 1,600 feet, of which 200 feet has been sunk in 1898. It has three compartments. There are twenty-seven exits. The ventilation is good. During the year 1898 there was installed a new hoisting engine, 30x72, built by the Union Iron Works, and also a steel gallows frame. There was also installed two combination skip and cages. The skips will hold about five tons each, and on top of each is a single-deck cage. The skips will be used only in hoisting ore or waste.

The Never Sweat.—This shaft is down 1,800 feet, of which 400 feet was sunk in 1898. The shaft has three compartments. There are fourteen exits. The ventilation is good. During the year 1898 there was put in place two new air compressors of the Ingersoll-Sergeant make, which will supply air enough to run 200 drills. Sinking was in progress at date of inspection. John C. Hanley is foreman of the mine.

St. Lawrence No. 1.—John Collins, foreman. The main shaft is down, 1,500 feet, of which 100 feet was sunk in 1898. Sinking was in progress at date of inspection. It has three compartments. There are seventeen exits. The ventilation is good.

St. Lawrence No. 3.—This shaft is down 600 feet, of which 400 feet has been sunk in 1898. There are two compartments. The shaft is sunk in the burnt district, where the fire of 1889 occurred, and the air in some places is heavily charged with gas. John Collins is foreman.

BOSTON & MONTANA COMPANY.

The mines operated by the Boston & Montana Consolidated Copper & Silver Mining Company during the year 1898 were the Leonard, Mountain View, West Colusa, East Colusa, Pennsylvania and Moose. They are all copper properties. A total of 864 men are employed at the mines of this company. Frank Klepetko is general manager and C. S. Batterman superintendent.

The Moose.—Stephen Williams foreman. Employs 20 men. The shaft is 300 feet deep. There are four exits. The ventilation is good.

The Leonard.—C. R. Davis foreman. Employs 150 men underground, ninety-three topmen and three engineers. The shaft is down 1,000 feet, 200 feet of which was sunk in 1898. There are ten exits. There is a system of electric flash light signals at all stations. The ventilation is good.

The Pennsylvania.—Employs 175 men underground, fifty topmen and three engineers. The shaft is down 1,025 feet, of which 225 feet was sunk in 1898. Electric call bells are in use at each level. There are four exits. The ventilation is good. On the 300 foot level horses are used for hauling the ore out to the shaft in cars. Horses are also used on the 600 foot level. Iron doors are in the crosscuts in case of fire.

Mountain View.—R. H. Dawe foreman. Employs 16 men underground, sixteen topmen and three engineers. The main shaft is down 1,400 feet, of which 200 feet was sunk in 1898. It has three compartments. There are fourteen exits. Electric call bells are in use on each level. The ventilation is good.

West Colusa.—John Miles, foreman. Employs 120 men underground, ten topmen and five engineers. The main shaft is down 1,100 feet, of which 400 feet has been sunk in 1898. Sinking was in progress at the date of inspection. Flash lights are used for call bells. Horses are used on all levels to haul ore to the shaft. They are hoisted out each night. A new steel gallows frame has been erected over this shaft this year. It is sixty feet high with 10 foot base. The ventilation is good.

East Colusa.—C. R. Davis, foreman. Employs forty-six men underground, eleven topmen and three engineers. The main shaft has two compartments and is down 800 feet. Flash lights are used for call bells. There are five exits. The ventilation is good.

BUTTE & BOSTON COMPANY.

The mines operated by the Butte & Boston Consolidated Mining Company during the year 1898 were the Michael Davitt, Berkeley, Blue Jay, Silver Bow Nos. 1 and 3, and East and West Grey Rock. Frank Klepetko is general manager, C. S. Batterman superintendent. The ore is copper, with silver and gold as bi-products. This company employs 549 men.

Michael Devitt.—Edward Finnegan, foreman. Employs nineteen men underground and two engineers. The main shaft is down 210 feet, of which 70 feet is vertical and 140 feet incline. There are fourteen exits. The air is extra good.

Berkeley.—E. Finnegan, foreman. Employs forty-five men underground, ten topmen and five engineers. The shaft is down 550 feet, all of which has been sunk this year. Flash lights are used as call bells. There are six exits. The ventilation is good.

Silver Bow No. 1.—W. E. Kane, foreman. Employs 144 men underground, twenty topmen and three engineers. The main shaft is down 1,020

feet and is in three compartments. Electric call bells are used. The ventilation is good. Horses are used for hauling ore to the shaft. There are stables for the animals on the 400 foot level. They are never brought to the surface.

Silver Bow No. 3.—W. E. Kane, foreman. Employs thirty-six men underground, nine topmen and three engineers. The main shaft is down 375 feet, of which 100 feet was sunk in 1898. The ventilation is good.

West Grey Rock.—William Williams, foreman. Employs thirty-eight men underground, one topman and three engineers. The shaft is down 700 feet. The ventilation is fair. There are two exits.

East Grey Rock.—Wm. Williams, foreman. Employs 110 men underground, seventeen topmen and three engineers. The shaft has three compartments and is down 1,600 feet, of which 200 feet has been sunk this year. There is an electric flash light system in use at the mine. There are four exits.

The Blue Jay.—B. H. Dunshee, foreman. Employs sixty-five men underground, thirteen topmen and three engineers. The main shaft is down 1,075 feet, of which 200 feet was sunk in 1898. It has two compartments down to the 600 level, and from that down it has three. It is on an incline of 75 degrees. Electric call bells are used. There are two exits. The ventilation is good.

PARROT SILVER & COPPER COMPANY.

The mines operated by the Parrot Silver & Copper Company during the year 1898 were the Parrot, Little Minah and Bellona. R. D. Grant is general manager, D. B. Gillis superintendent and Jos. Bryant foreman.

The Parrot employs 218 men underground, twenty-five topmen and three engineers. The main shaft is down 1,122 feet and has three compartments to the 400 level and four from that down. Electric call bells are on all stations. There are two double-deck cages with safety doors. There are two exits. The ventilation is excellent.

The Little Minah.—Jos. Bryant, foreman. Employs twelve men underground, two topmen and two engineers. The main shaft is down 600 feet, of which 200 feet was sunk in 1898. It has three compartments. There are two exits. The ventilation is good.

Bellona.—J. Bryant, foreman. Employs twelve men underground, two engineers. The main shaft is down 500 feet, all of which was sunk in 1898. There is but one exit. This is a new property and only sinking is in progress.

MONTANA ORE PURCHASING COMPANY.

The mines operated by this company during 1898 were the Rarus Nos. 1 and 2, and the mines worked under lease and bond were the Cora, Nipper and Parnell. John MacGinnis is the general manager.

The Rarus employs 215 men underground, 35 topmen and five engineers. The mine is worked through two shafts. No. 1 shaft is 500 feet deep. No. 2 shaft is 900 feet deep. There are fifteen exits. The ventilation is good. All the ore is hoisted through No. 2 shaft. Nic Treloar is foreman.

The Nipper is owned by Hickey & Co. John Kane is foreman. Sixty-two men are employed. The main shaft is 500 feet deep. There is only one exit. Ventilation is fair.

The Parnell is owned by Driscoll & Co. John Birmingham is foreman. Sixteen men are employed. The shaft is down 650 feet. There is only one exit. Ventilation is fair.

The Cora is owned by Conrad & Young. John Bottego is foreman. Thirty-six men are employed. The main shaft is down 300 feet, all of which has been sunk in 1898. Sinking is still in progress. There is but one exit. The ventilation is fair.

THE WASHOE COMPANY.

The Moonlight was the only mine operated by this company during the year 1898. Charles F. Booth is the general manager. Wm. Skyrme is superintendent and foreman. Sixty-eight men are employed. The main shaft is down 1,300 feet, of which 400 feet was sunk in 1898. The ventilation is good. There are connections with the Never Sweat, making in all three exits.

THE COLORADO MINING & SMELTING COMPANY.

The mines operated by this company during the year 1898 were the Gagnon and Otisco, the latter under lease and bond. Henry Williams is general manager. John Hewitt is superintendent of the Gagnon and John Pond is foreman.

The Gagnon employs 225 men underground, thirty topmen and three engineers. The shaft is down 1,625 feet and is an incline of seventy-four degrees. One hundred feet was sunk in 1898. Electric call bells are on all stations. The ventilation is good in every part of the mine and special precautions are taken to guard against fire and other dangers.

The Otisco is owned by the Largey estate and others. E. J. Schwefel is foreman. Twelve men are employed. The shaft is down 200 feet, all of which was sunk in 1898. No stations have yet been cut. The ventilation is good.

COLUSA-PARROT MINING COMPANY.

The mines of this company, of which W. A. Clark is the principal owner, operated during the year 1898, were the Original, Stewart and Colusa-Parrot. A. H. Wethey is general manager and Thomas Bryant superintendent.

Three hundred and fifty-nine men are employed in the mines of this company.

Original.—Frank Fitzgerald is foreman. Employs 105 men underground, ten topmen and three engineers. The main shaft is down 1,100 feet, of which 100 feet was sunk in 1898. The shaft is on an incline of 70 degrees. A double-deck cage and skip are used for hoisting. There are two exits. A new shaft has been started and raises are being driven up from each level. The ventilation is good.

Stewart.—William Bailey is foreman. Employs thirty-five men underground, six topmen and five engineers. The shaft is down 800 feet, of which 200 feet has been sunk in 1898. It has two compartments, and is an incline of about 70 or 71 degrees. There are two exits. The ventilation is good.

Colusa-Parrot.—Thomas Kilgallon, foreman. Employs 170 men underground, twenty-two topmen and three engineers. The shaft is down 1,400 feet, of which 20 feet was sunk in 1898. It has two compartments down to the 300 level and three compartments from that down. There are three exits. The ventilation is good.

ALICE COMPANY.

The mines operated by the Alice Gold & Silver Mining & Milling Company during the year 1898 were the Alice, Blue Wing, Magna Charta and Valdemere. T. W. Buzzo is general manager and superintendent. The company employs 148 men in the mines.

Alice.—Thomas Williams, foreman. Employs thirty-five men underground, nine topmen and three engineers. The shaft is down 1,500 feet, but is only worked to the 1,000 foot level. Electric call bells are used. There are five exits. There are two single-deck cages with safety doors. The ventilation is good.

Blue Wing.—Thos. H. Williams, foreman. Employs forty-three men underground, two topmen and three engineers. The main shaft is down 650 feet. One single-deck cage with safety doors is used. There are four exits. The ventilation is excellent.

Magna Charta.—T. H. Williams, foreman. Employs forty-one men underground, two topmen and two engineers. The shaft is 700 feet deep. One cage has safety doors. Electric call bells are used. There are three exits. The ventilation is good.

Valdemere.—T. H. Williams, foreman. Employs six men underground, one topman and one engineer. The shaft is down 210 feet and has three compartments. There are three exits. The ventilation is good.

MISCELLANEOUS MINES.

Speculator.—Owned by the Largey estate. Operated by the same. Wm. L. Clark is general manager and superintendent and J. F. Case is foreman.

Thirty-six men are employed underground, four topmen and three engineers. The main shaft is 900 feet deep, of which 200 feet was sunk in 1898. It has two compartments and is partly on an incline, being 70 degrees down to the 800 foot level. The other 100 feet is vertical. A skip with safety appliances is used. There are two exits. The ventilation is good.

Ella.—Owned and operated by J. R. Bordeaux & Co. J. R. Odgers is foreman. Employs ten men underground, one topman and two engineers. The shaft is down 250 feet and sinking was in progress at date of examination. It is a two-compartment shaft. There is but one exit. The ventilation is fair.

West Modoc.—Owned by the Anaconda Company and is operated under lease by J. E. Hosking, who is in charge. Employs eleven men underground and two engineers. The main shaft is down 200 feet and has two compartments. There are two exits. The ventilation is good.

Alex. Scott.—Owned by J. A. Murray, and is operated under lease by John Gillie. A. H. Copple is foreman. Employs thirteen men underground, two topmen and two engineers. The shaft is down 680 feet, of which 100 feet was sunk in 1898. It has two compartments. One single-deck cage with safety appliances is used. There is but one exit. The ventilation is good.

Original No. 5.—Owned by the Parrot Co. and is operated by Brown & Benham, under lease. W. G. Benham is general manager and H. H. Brown is superintendent and foreman. Employs twenty men underground, six topmen and three engineers. The main shaft is down 358 feet, of which 187 feet were sunk in 1898. It has two compartments. There are two exits. The ventilation is good.

Deadman.—Owned by the Anaconda Company and is operated under lease by Hickey & Dwyer. Employs 14 men underground, two topmen and two engineers. The main shaft is down 250 feet. It has two compartments. There is only one exit. The ventilation is good.

Minnie Healey.—Owned by Devlin & Kelly and operated under lease by Miles Finlen, who is general manager and superintendent. John Cook is foreman. Employs fourteen men underground, four topmen and two engineers. The main shaft is down 600 feet and has two compartments. There are three exits. The ventilation is good.

Silver Hill.—Owned by McKenzie & McDonald and is operated under lease by James Cummings & Co. Mr. Cummings is in charge. Employs twelve men underground, two topmen and one engineer. The shaft is 400 feet on an incline of about 50 degrees. One hundred and fifty feet has been sunk in 1898. A 30 horse-power electric engine is in use. There are two exits. The ventilation is good.

Ramsdell Parrot.—Owned by the Anaconda Company and operated under lease by Miles Finlen, who is superintendent and general manager. John Reilly is foreman. Employs 106 men underground, twelve topmen and three engineers. The main shaft is down 600 feet and has two compartments. There is a connection with the Little Anaconda at the 300 foot level. The ventilation is fair.

Silver King.—Owned by J. A. Murray and operated by Sanders & Co. under lease. E. E. White is foreman. Employs fourteen men underground, four topmen and two engineers. The main shaft is down 175 feet, of which fifty feet was sunk in 1898. Fifty feet of the shaft is vertical and 125 feet on an incline. There are two exits. The ventilation is good.

BEAVERHEAD COUNTY.

Cleve.—This mine is owned and operated by the Hecla Mining & Smelting Company. Henry Knippenberg is the general manager, Samuel A. Barber superintendent and Jorn Hull foreman. Employs twenty-four men underground, two topmen and one engineer. The mine is worked through a shaft 1,425 feet deep on an incline of twenty degrees. The ore is silver and gold. There are two exits. The ventilation is good.

Trapper.—Located at Hecla and owned by the H. M. & S. Co. James Todd is foreman. The mine is worked through a tunnel 300 feet long. Eleven men are employed. There are three exits. The ventilation is good. The ore is silver and gold.

Atlantic.—Owned and operated by the H. M. & S. Co. Daniel H. McMasters is foreman. Employs thirty-five men underground and ten topmen. The mine is worked through a tunnel 3,200 feet in length. The ore is silver and gold. There are seven exits. The ventilation is good.

Ariadne.—Owned and operated by the H. M. & S. Co. Alex McDonald is foreman. Employs twenty-five men underground, five topmen and one engineer. The ore is silver, lead and copper. It is worked through a shaft 850 feet deep, on an incline of twenty degrees. There are three exits. The ventilation is good.

Hecla.—Owned by the H. M. & S. Co., and operated under lease by Cameron & Conway. There is a tunnel in about fifty feet. The ore is silver and lead. There are two exits. The ventilation is good. Eight men are employed.

New Departure.—Located at Bannack. Owned and operated by Lawrence A. Brown, who is in charge. There is a group of seven claims worked through four tunnels, and all are connected. The ore is gold and silver. Ten men are employed. The ventilation is good.

Excelsior.—Located at Bannack. Is owned by the Western Mine Enterprise Company and is worked through a tunnel 340 feet in length. There is also a shaft sunk on an incline of 40 degrees to a depth of 293 feet. The ore is gold. There are sixteen men employed underground, two topmen and one engineer. There are two exits. The ventilation is good.

DEER LODGE COUNTY.

Emery.—Located in Zosel district. Owned by N. J. Bielenberg and others, and operated under lease by W. I. Higgins, who is general manager and

superintendent. P. C. Condaw is foreman. Employs twenty men underground, two topmen and two engineers. The main shaft is down 500 feet on an incline of 40 degrees, and is one compartment. The ore is gold, silver and lead. There are five exits. The ventilation is good. An Ingersoll-Sergeant air compressor having a capacity of three drills is in use.

Gold Coin.—Owned and operated by the Gold Coin Mining & Milling Company. Located at Gold Coin. G. T. Ingersoll is general manager and superintendent. Charles Coyle is foreman. Employs thirty men underground and six topmen. The Red Fir and Josie are the principal claims owned by this company. The shaft on the Red Fir is down 90 feet on an incline of about 50 degrees. It has two exits. The ventilation is good. An engine operated by compressed air is used. The Josie is developed by a tunnel of about 500 feet and is timbered with square sets. There are two exits. The ventilation is good.

MADISON COUNTY.

Thistle.—Located at Rochester and operated by the Thistle Mining & Milling Company. J. E. Woods is in charge. Employs eight men underground and one engineer. The main shaft is down 200 feet and has two compartments. There are two exits. The ore is gold and silver. The ventilation is good. A Ledgerwood engine, 6x10, with a 5-8 round rope, is in use.

Elgin.—Located at Rochester. Owned by P. E. White and is operated under lease by Merritt & Co. The main shaft is down 200 feet, fifty feet of which was sunk in 1898. The shaft is an incline of 40 degrees. Seven men are employed underground and two engineers. The ore is gold and silver. There are two exits and the ventilation is good. A Bay State 7x12 engine and 5-8 round rope with bucket are used. E. W. Merrit is in charge.

Watseka.—Located at Rochester, owned by F. R. Merk, and operated by Wm. Farlin, who is in charge. The main shaft is 160 feet on an incline of 50 degrees. A Buffalo whim and a 5-8 round rope and bucket are used. The ore is gold and silver. There are two exits. The ventilation is good. Eight men are employed.

Fatal Accidents.

SILVER BOW COUNTY.

Jerry Buckley, a station tender employed at the Never Sweat mine, was instantly killed on Dec. 6, 1897, by falling from the cage between the 900 and 1,000 foot levels. Fred Schoanburn, his partner, testified before the coroner's jury that while on their way up the shaft a quantity of rock fell from above and the jar knocked Buckley off the cage. He did not miss Buckley until he reached the 900 level. Pat Egan, the foreman, testified that the

rock fell from the 600 level, where a skip was being loaded. In his opinion Buckley did not have hold of the safety bar. The jury decided that Buckley came to his death by his own carelessness.

John McCarthy, a miner employed at the Bell mine, was instantly killed Dec. 7, 1897, at 11 p. m., by a cave of ground on the fifth floor of the 1,500 foot level. He and his partner, Thomas Doyle, were putting in an upper hole. Doyle was striking and McCarthy was turning. Two cars of ground fell away from the top, striking McCarthy and knocking him down on the floor with such force that it drove him through the lagging and he fell to the floor below. Where the ground fell away from, there was a slip in the back, and the force of the drilling caused it to break away. The stope seemed to be perfectly safe. There was not ground enough out to put in a set of timbers. The coroner's jury after hearing the above facts brought in a verdict that he came to his death by his own carelessness.

Charles D. Lemon, a miner employed at the Leonard, was instantly killed on the 800 foot level, west drift, at about 9 p. m., on Jan. 3, 1898, by an explosion. He and Oxley Johnson, his partner, had eleven holes drilled and were going to fire the bottom and cutting holes, six in number, first. When they had them all about spit, the first hole spit went off, killing Lemon and knocking Johnson down, but the latter was able to reach a place of safety before the rest of the holes went off. Johnson stated before the coroner's jury that they used six-foot fuse to each hole, but that they remained too long in the breast, as one of the two fuses did not take. I tested five feet and got 2 minutes and 10 seconds. The coroner's jury brought in a verdict that the deceased came to his death by his own carelessness.

John F. Sullivan and M. C. Flaherty, two miners employed at the Anaconda, were overcome by gas from a fire in a crosscut on the east side of the Never Sweat, on the 700 foot level, at about 9 a. m., Jan. 4, 1898. James D. Leary and James Fleming, at the coroner's inquest, stated that they were working in the south crosscut when they noticed smoke issuing from the lateral drift. They, in company, with Sullivan & Flaherty, started towards the Never Sweat to locate the fire. They got about 300 feet when their candles went out. Leary and Fleming returned to the Anaconda shaft, but Sullivan and Flaherty went on and were undoubtedly overcome by gas. Sullivan was found in the lateral drift about 400 feet from the Anaconda shaft, and Flaherty about 100 feet from the shaft. The fire was in the third crosscut off the lateral drift, about 400 feet from the Never Sweat. At this point there had been no work done for some time, as the stopes are all worked out and filled in with waste. Up to the 600 foot level at the end of each crosscut there is a chute, and the fire started directly under the one in the third crosscut. I learned that on the day before the fire a man named W. F. Moran was engaged in taking up rails, and in my opinion he must have dropped a piece of candle and it smouldered there for hours. The chute being an upcast, it fanned the fire and the carbonic acid gas which formed caused the death of the two men. The corner's jury brought in a verdict that

death was caused by suffocation, but were unable to determine the origin of the fire.

Benjamin Sener, a miner employed at the Pennsylvania mine, was instantly killed on Jan. 8, 1898, at about 10 p. m., by an explosion. In sinking the shaft, he and his partners, Wm. McPike, John W. Hopkins and John Mutch, had a round of 18 holes to fire. McPike and Sener were working on the west side, Hopkins and Mutch on the east. The latter had eleven holes to fire and Sener and McPike had seven. The men on the east side had all their holes spit but two when the first explosion occurred on the west side. The explosion rang the bell and all made a rush for the cage. Three of them succeeded in getting on it. Chas. C. Mitchell, the engineer, stated before the coroner's jury that when the first explosion took place the bell rang and he pulled the cage up a few feet and held it there until he heard the second shot. Then he realized what had taken place and pulled the cage up, when it was found Sener was missing. I tested the fuse and found it all right. The jury found it to be an unavoidable accident.

George Hatherell, a station tender, was instantly killed at the Blue Jay mine on Jan. 30, 1898, at 4 p. m., by being knocked down the shaft by the cage. H. E. Emerson, the shift boss at the mine, stated before the coroner's jury that he was on the 800 foot level when the accident occurred. Hatherell was taking out some plank, about a set below the station in the west compartment, and was standing on some lagging when the cage came up the center compartment and struck the end of a plank which Hatherell held in his hands, with such force that he was knocked down the shaft, falling to the 900 foot level. Emerson also stated that he had warned Hatherell to be careful; that he had lots of time to bring the cage to a stop by a signal, but did not think it necessary. In my opinion Emerson should have given a stop bell when he heard the cage coming, and Hatherell should never have been put to work of this kind, as he was not a miner. The coroner's jury, after hearing all the above facts, brought in a verdict that the deceased came to his death by his own carelessness.

Pat Coughlin, a miner employed at the Anaconda mine, was instantly killed on April 18, 1898, at 2:30 p. m., on the eighth floor of the 1,200 foot level, south ledge. He and his partners, Thos. Devine and John McGovern, were working directly over a chute filled with ore to the point where they were at work. Devine and McGovern stated before the coroner's jury that they were notified that there was going to be a run made on the chute from the level below. Coughlin was standing on top of the pile of ore, which was raised up several feet from the floor. The rock gave way under Coughlin's feet and he was carried down with it to the fourth floor, where he was taken out dead. Tons of rock had fallen with him. J. D. Holland, shift boss, stated before the coroner's jury that he notified the men that the carmen on the sixth floor were going to make a run on the chute. The jury brought in a verdict that his death was due to his own carelessness.

Morgan G. Johns, a miner, working a lease on the Belle of Butte, was instantly killed on May 28, 1898, between 3:30 and 6:30 p. m., by a cave of

ground on the 130 foot level. Wm. Dunn stated before the coroner's jury that he was working on the 40 foot level and Johns on the 130 foot level. They went to work in the morning at 9 a. m., and were going to work until 3 or 4 p. m. before going to dinner. He could hear Johns working at 3 p. m., at which hour Dunn went to dinner. He waited until 6 p. m. for Johns to come home. Failing to do so, Dunn went to the mine and found his partner dead at the bottom of the shaft on the 130 foot level. I found that Johns had been working in a stope and was picking down ore, when a cave came from the hanging wall and knocked him down. He fell on his head. How long he had been there before Dunn reached him was not ascertained, but it must have been at least three hours. The jury decided that it was an unavoidable accident.

Coleman Tierney, a miner employed at the Bell mine, received fatal injuries by a blast on the morning of July 23, 1898, at 4 p. m., on the second floor of the 1,300 foot level, and died on the following day. He and his partner James Meehan, had put in a round of three holes and Tierney went after the powder. When he returned he loaded the bottom hole and Meehan went back some ten feet to put in some braces to protect the timbers from the shots. He saw Tierney put in the second stick of powder and a few seconds later there came an explosion and Tierney was blown back about nine feet. The tamping stick had been driven into his body. From my investigation I am of the opinion he had the cap and fuse in the hole, and by pressing too hard on the primer caused it to explode. The coroner's jury found that the deceased came to his death by accident and that he alone was to blame.

Richard Williams, a miner at the Grey Rock mine, was instantly killed by a cave of ground on August 2, 1898, at about 3 p. m., on the thirteenth floor of the 1,300 foot level. Thos. Bolitho, his partner, stated before the coroner's jury that he was on the floor below handing up drills to Williams, and in the act of doing so a heavy piece of ground fell away from the hanging wall. It weighed several tons. It only fell a few feet but the weight crushed the life out of Williams. The accident took place directly under the sill floor of the 1,200 foot level and the posts used were only three feet five inches, so that Williams must have been on his knees at the time of the cave. Several witnesses were examined, but they all stated that the ground seemed solid. The jury decided that it was an unavoidable accident.

Andrew Rosetti, a timberman employed at the Original mine, was almost instantly killed on August 19, 1898, at 2 p. m., by a rope breaking while coming to the surface from the 1,100 foot level on a double-deck cage. The rope broke about 340 feet from the surface. Richard Hancock came up with him to the 1,000 foot level. After Hancock got off he gave the signal to hoist to the surface. At a point forty feet below the 300 station a portion of a guide broke and caught in the cage, breaking the one-inch round rope and the cage fell to the 1,100 or bottom level. Rosetti died two hours later, his backbone having been broken. John C. Driscoll, the engineer, stated at the inquest that he was not running at a high rate of speed and felt no jar.

Thos. Bryant, the foreman, stated that the rope had been used eight months and he considered it safe. In my opinion it was crystallized at the point where it separated. Had there been longer teeth in the safeties I believe the cage would have caught, but the teeth were small and the slimy matter on the guides filled them up. The verdict was that the deceased came to his death by the rope breaking and that the company or management was not to blame.

John Connelly, a miner employed at the Parnell mine, was instantly killed on August 21, 1898, at about 12:30 a. m. He and his partner, John Lee, a carman, were working in a crosscut on the 600 foot level, and after firing a round of holes they went to the surface. They remained on top for about an hour and then went down again and began to make arrangements to set up their machine. The gas from the powder was so strong, however, that they could not work and they started for the surface. After getting on the cage and when near the 400 foot level, Connelly fell off. He fell to the sump ten feet below the 600 foot level and when taken out every bone in his body was broken. At the inquest several witnesses stated that Connelly was frequently notified by the foreman not to go down after firing until the air was good. There were no safety doors on the cage. Had there been it is possible a life would have been saved. The jury found that the deceased came to his death by his own carelessness.

Frank Sando, a miner, was instantly killed at the Alice mine on August 26, 1898, at about 3:30 p. m., at the 300 foot level. He and his partner, Richard Gartell, were leasing in this part of the mine and left their work to go to the surface to get some tools. They stepped on the cage and gave the signal to hoist. Sando about this time noticed on the station a dull pick and stooped down to pick it up. He was in the act of passing the tool to his partner, when the engineer, in answer to the signal, started to hoist the cage. At that moment Sando was leaning over the edge of the cage and when the cage started he was thrown off, his body falling to the 1,000 foot level. The accident was a particularly sad one, owing to the fact that he was but eighteen years of age. The accident was due to the thoughtlessness of the youth in stepping from the cage after giving the signal to hoist. The jury exonerated the company from blame.

Patrick Healey, a miner employed at the Never Sweat, received such injuries on September 11, 1898, that he died on September 13. He and his partner, T. J. Lynch, were working on the fourth floor of the 1,300 foot level when without warning a large piece of ground fell from the hanging wall, striking Healey on the back. He died two days later. There was no inquest held.

William Gilronan and W. C. Flinn, two miners employed at the East St. Lawrence, were so terribly burned by steam on the 500 foot level on October 9, 1898, at 5 p. m., that Gilronan died on October 10, at 5 p. m., and Flinn on October 11, at 3 p. m., after terrible suffering. The accident happened in the burnt district where the fire of 1889 occurred. The ground there is yet extremely warm and the two men carried with them a hose which was at-

tached to a hydrant at the 100 foot level for the purpose of turning water on the ground to cool it off. The rock was so heated, however, that the water was turned into steam so suddenly that the men were unable to reach a place of safety before they were almost boiled alive. John Cannon and George Montgomery, who worked there on the day of the accident, stated before the coroner's jury that there was no extra heat when they quit work at three p. m. William Page, the shift boss, stated that the orders were to place the hose in position and then come up to the 100 and turn on the water. If these orders had been carried out, he said the accident would not have occurred. The jury found that it was their own carelessness that caused the accident.

W. A. Waller, a leaser on the Silver King mine, was instantly killed on October 12, 1898, at 7 p. m., by being caught in the shaft between a roller and the bucket. Waller went to the mine in an intoxicated condition and insisted upon going below. He went down and remained about half an hour. While being hoisted from the mine, at a point about fifty feet from the surface, where the shaft changes from a vertical to an incline, he was struck by the roller and his life crushed out instantly. B. M. Lindsay, the engineer, stated before the coroner's jury that he felt a jar and immediately stopped the engine. When an investigation was made Waller's lifeless body was found tight against the roller. In my opinion the foreman, Bernard Coll, should not have allowed Waller to go down the shaft in his intoxicated condition, as he was not able to take care of himself. Waller was the owner of the lease. The jury brought in a verdict that he came to his death by his own carelessness.

Andrew Richter, a shoveler employed at the Stewart mine, received such injuries at that property at about 4:30 p. m., October 19, 1898, that he died a few hours after being removed to a hospital. He was shoveling ore on the first floor of the 700 foot level, into a car that was on the track below, when a piece of ground fell from the hanging wall, striking Richter and breaking his back. At the coroner's inquest Edward York stated that he was on the same floor when the accident took place and that there were no timbers at this place when the ground fell. If there had been, the witness said, the accident would not have taken place. He also stated there was enough ground out to put in a set of timbers two days before the accident occurred, but the foreman gave him orders not to timber up until there was room for three sets. York's partner, John Burke, denied this statement, and said the foreman had given them orders to timber up on the morning of the accident, but that they could get no floor cleaned up in time. Wm. Bailey, the foreman, corroborated this statement, and said the men had refused to obey orders. I found there was ample room for a set of timbers on the hanging wall side and if they had been put in place the accident could not have happened. The coroner's jury found that Burke and York had failed to obey orders and exonerated Foreman Bailey.

Emil Flankey and Herman Heikkila, two miners employed in the Otisco mine, were killed in the shaft on October 20, 1898, at about 5 p. m. It is not

known positively how the accident occurred, as there were no eye-witnesses, but from all the facts obtainable in the case there is little doubt that the crosshead stuck in the shaft and then fell away, after the men had gone down about seventy-five feet. John O. Westlin, the engineer, stated before the coroner's jury that Flankey and his partner came up to eat lunch and got into the bucket to go below again. He lowered them to a point about seventy-five feet from the surface when he felt a jar and stopped the engine. He sent the topman down the ladder and he returned saying both men were killed. Witness was not able to state if the crosshead went down with the bucket or not. Other witnesses testified to the same effect. In my opinion ice had formed on the guides at the surface while the men were eating lunch and held the crosshead there while the bucket went down with the men. After some time the crosshead became released and fell on top of the men, crushing their skulls. There was no clamp on top of the crosshead, because they were sinking the shaft and the guides were about fifteen feet from the bottom, and when the crosshead reaches this point it is held there and the rope allowed to run through it to the bottom with the bucket. The coroner's jury found that it was an unavoidable accident.

Clarence R. Molen, a miner employed at the Mountain Con. No. 2, was instantly killed by a cave of ground on the third floor, west side, 1,200 feet level, at 9:30 a. m., October 22, 1898. Joseph Hagey, his partner, stated before the coroner's jury that he and Molen were putting in a set of timbers. They had one post standing and Hagey turned around to get the other post, when a large piece of ground fell from the hanging wall, striking Molen and driving him through the floor, killing him instantly. He also stated that they noticed the ground being bad and had tried to pull it down with a pick, but it would not come, so they thought they would let it stand until they got in their set of timbers. The coroner's jury found that the deceased came to his death by his own carelessness.

Telesphore Daignault, a miner employed at the Colusa-Parrot mine, dropped dead on the third floor of the 400 foot level at about 11 o'clock p. m., October 31, 1898. He and Manuel Puglese had two holes drilled and Puglese went down the manway and left Daignault to fire them. He had only gone down about eight feet when he heard a peculiar sound, and returning found his partner lying dead. Wm. Bowen, who was working on the floor below, gave about the same testimony at the coroner's inquest. The jury returned a verdict that his death resulted from heart failure.

Thomas Rutter, a miner employed at the Belle of Butte mine, was instantly killed by being suffocated on November 12, 1898, at 11:30 a. m., on the 160 foot level. His partner, John Knotwell, stated before the coroner's jury that Rutter went up to the 100 foot level to clear the chute. At the noon hour the witness went up to the 100 to call Rutter, and not receiving any response began a search. He found Rutter's body under a lot of loose ore in the bottom of the chute. There were no bruises on the body. Herb. E. Snyder corroborated Knotwell's testimony. The jury found that the deceased came to his death from suffocation.

Robert McFadden, a miner employed at the Berkeley mine, was almost instantly killed on November 15, at about 7:30 a. m. in the main shaft, about 480 feet from the surface. He and his partners, Wm. Henderson, George Morgan and John Kelly, went on shift at 7 a. m., being employed in sinking the shaft. George Morgan stated before the coroner's jury that they had hoisted two buckets of rock and McFadden was picking in the northeast side of the shaft, when he noticed McFadden drive his pick into a hole. Immediately an explosion occurred and he was knocked down. He got up and went to the bell rope and rang 9 bells, the danger signal. Kelly and his partners gave about the same evidence. They were badly cut about the face and body. McFadden died about two hours after being brought to the surface. One of his legs was almost cut off and he presented a terrible appearance. He was probably over the hole when it exploded. The shaft is a three-compartment, and Morgan was on the south side, Kelly and Henderson on the west side and McFadden on the northeast side. Two shifts of miners were employed, four men to the shift, and they worked opposite each other single-handed. The night shift had in nine holes and they fired at midnight. They all claimed that they heard the nine reports. Anton Barnabo worked on the opposite shift to McFadden, and it was one of the holes that he drilled that did not explode. He stated that it was four feet deep and had four sticks of powder in it. In my opinion the men on the night shift made a mistake in counting the holes, and if Barnabo had used any caution he could have found the missed hole. It seemed to me to be a clear case of carelessness on his part, for the shaft was almost clear when he went off shift. The coroner's jury found that McFadden came to his death by an explosion of a missed hole but that no one was to blame.

GALLATIN COUNTY.

Hugh Friel, a miner at the Chestnut coal mine, was instantly killed by a fall of coal in room 43 on August 4, 1898, at about 12 o'clock noon. Friel and his brother were working partners, when about eight tons of coal fell without warning. Hugh was almost buried under the mass. When taken out life was extinct. He was seventeen years of age. There was no inquest held. The vein in this mine is vertical and the coal is soft, and if any of the rooms are idle for a few days it becomes dangerous, the coal being so soft that posts are of but little use. The only remedy is to keep the rooms going all the time.

LEWIS AND CLARKE COUNTY.

James Wedge, a miner employed at the Drum Lummon mine, was instantly killed on August 10, 1898, at 8 p. m., between the 700 and 800 levels, by being carried down about 30 feet in a stope. With his partner, John Sennet, he was in the act of setting up the machine. They had the bar in

place between the walls when suddenly the broken ore they were standing on gave way and Wedge was carried down with the rock. Sennet caught the bar and held on to it until the ground settled. When Wedge was dug out life was extinct. In my opinion the weight was too much for the lagging. They had stulls five feet apart and over them heavy lagging was laid, and as the ore was broken it was left on them until the stope was worked out. Some of the lagging gave way, causing the run on the ore. The coroner's jury found that it was an unavoidable accident.

Jabez Shovell and John Foster, two miners employed at the Belmont mine, near Marysville, were killed by a hitch giving way and allowing a stull to fall, on Nov. 4, 1898, at 2 p. m., on the third floor above the main tunnel. Shovell was working on the fourth floor and went down to the floor below to get some drills from a fellow workman. This man was John Foster. While talking to Foster one of the stulls overhead gave way. The hitch where the end of the stull was in on the footwall side broke down and allowed the lagging to come down also. There were several tons of loose rock on the lagging and Shovell and Foster were caught and buried up. Shovell was instantly killed and Foster died on the following day from his injuries. It was an unavoidable accident.

CASCADE COUNTY.

C. J. Sundberg, a miner employed at the Belt coal mine, was instantly killed on February 24, 1898, at about 5 p. m., in room 44, seventh south main entry. He and his partners, Aaron Sundberg and C. Sundberg, were firing a hole that had been drilled in about 4 feet 6 inches, and they had loaded it with 5 1-2 sticks of powder, with 3 1-2 feet of fuse. After spitting their fuse they went back about eighty feet and after hearing a report and thinking that it was the shot that went off, C. J. Sundberg went back to find out how much coal had been broken down. Just as he got back to the place where the hole had been drilled the explosion occurred, killing him almost instantly. The coroner's jury brought in a verdict that the deceased came to his death by an explosion and that no one was to blame.

Jacob Boomala, a miner employed at the Sand Coulee mine, was instantly killed on July 9, 1898, at about 11:15 a. m., at the seventh butt, fourth east, by a fall of slate. Boomala had drilled a hole in the pillar and after firing it he went down the entry to a place of safety. After firing he and his partner, a man named Otto Matson, started back and had just reached the point where the hole was, when about fifteen tons of slate fell away from the roof, striking Boomala and killing him instantly. James W. Cummings, the pit boss, stated before the coroner's jury that he notified Boomala not to fire the hole, as it would blow out the timbers. I made an investigation and found the air very bad where the accident had taken place, and in my opinion it was not a fit place for any man to work in. It must have been impossible for the deceased to have seen the roof. I notified the boss to close down that

portion of the mine until such time as the company could supply good air to the employes, which could be done with very little labor. The coroner's jury found that the deceased came to his death by his own carelessness.

JEFFERSON COUNTY.

Joseph Kosma and Harry Andrews, two miners employed at the Ruby mine, in the Lowlands, were instantly killed on September 9, 1898, at 9:30 a. m., by being caught in a cave. Andrews and his partner, Thomas Edwards, were working in a stope about twenty feet below the 200 foot level, when without any warning the timbers began to fall around them. Edwards jumped into a nearby crosscut and escaped injury. Andrews ran in an opposite direction and was found about twenty feet from the place where he was working. Kosma was working on the 150-foot level, filling a car at a chute when the cave came. He was carried down with it and his body was found about six feet below the 200 foot level. His body was found on September 13, and Andrews' body was discovered on September 30. An inquest was held and Foreman Buckley stated that he was through the mine before the cave, and found all the timbers standing and everything seemed to be in good shape. None of the timbers seemed to be taking weight. I made a very close examination of the accident and was at the mine up to the time Andrews' body was taken out. I found the cave to be 125 feet in height, twenty-two feet in width and about thirty feet in length. The work of recovering the bodies was slow, as the mass of timbers and the amount of waste that had to be removed made it a mammoth job; in fact, all the waste or fillings had to be taken out and then hoisted to the surface. In my opinion the cave started at a point about twenty-five feet below the sill floor of the 200 foot level. Andrews and his partner, Edwards, were filling in the set below them with waste when the accident occurred, and it is my opinion one of them knocked out a post by letting a large piece of rock fall, and as the ore body or ledge is almost vertical, the knocking out of the post with square sets acted as a key, the weight doing the rest. An inquest was held on September 13 on Kosma and on Andrews on September 30, and in both cases the jury found it was an unavoidable accident.

L. P. Hagman, a miner at the Minah mine, near Wickes, was instantly killed on September 21, 1898, at 4:30 p. m., by an explosion. He was working in a tunnel, about 1,800 feet from the surface, and was preparing to load a round of holes. He had nine sticks of powder in one hand and was putting on a cap. He took his knife to slit open the cap on the end, when it exploded. A part of the box of caps also exploded. There was a full box of powder only a few feet away from where the explosion occurred, and the force of the concussion broke the box and scattered the powder all over the tunnel. Had it exploded it would have caused a terrible loss of life. It was frozen, however. The coroner's jury found that it was an accidental death.

CARBON COUNTY.

Ervin Davis, a miner employed at the Bridger mine, met death by drowning at the mine on June 23, 1898, at about 2:30 a. m. He and his partner, J. C. Shaw, were working in the sixth crosscut in the Beck entry. Shaw stated before the coroner's jury that they heard a peculiar sound and started for the main entry, a distance of about twenty feet, when they saw a terrible rush of water coming down the entry. They were at a point about 900 feet from the surface. They advanced towards the surface with the other workmen who had been attracted by the rushing water. There were eight men in all in the mine at the time. L. J. Kelly and John Melin stated that they were working in the seventh crosscut, which is 50 feet below where Davis and Shaw were working. The lamps were soon extinguished by the flood and they had a very difficult time in reaching the surface. There was a pipe line running the full length of the main entry and it was this that saved the lives of the other seven men, as it was used as a signal. Stephen Dobio stated that at a point about 300 feet from the surface, Davis called to him for help and that he could no longer stand the terrible ordeal, but as he was almost exhausted himself, he could render no assistance. The water at this time was rushing in at a terrible rate and it was about 2 1-2 feet deep, carrying timbers, ties and rails with it. This was the last seen of Davis alive. I investigated the accident and found the entry full of water when I arrived at the mine. I had two pumps placed in position and after five days' work found Davis' body about 500 feet from the surface. The night of the accident there was a phenomenal rainfall in that vicinity that caused the gulch to fill up to such an extent that the culvert at the mine got blocked up with the debris, and the water raised and broke into the slope. The coroner's jury found that it was an unavoidable accident.

DEER LODGE COUNTY.

James Boyd, a miner employed at the Gold Coin mine, was instantly killed by a cave of ground on November 11, 1898, on the second floor of the ninety foot level at about 4:30 a. m. W. F. Pfaff, his partner, stated before the coroner's jury that he was about twenty-five feet from Boyd and he heard the timbers cracking. A second later the cave came, catching Boyd and burying him up. On my arrival at the mine I found there had been a fall of five or six tons of rock from the hanging wall side, and in my opinion if the timbers had been well blocked up on top and also along the hanging wall, the accident would not have taken place. It seemed to me to be a clear case of negligence on the part of the foreman, who was apparently more interested in getting out ore than in looking after the safety of his men. The coroner's jury found that Boyd's death was due to his own carelessness. This mine is poorly timbered and I notified the management to that effect.

NON-FATAL ACCIDENTS.

Dennis Hannifan, a miner employed at the Mountain Con. No. 2, had his leg broken December 30, 1897.

Oxley Johnson, a miner at the Leonard, was injured by a blast on the 600 foot level, January 3, 1898.

C. A. Beaton, superintendent, and Victor Ericson and Emil Larson, miners at the Gold Coin, in Deer Lodge county, were severely injured January 13, 1898, by drilling into a missed hole. Each lost an eye.

John Lowney, a miner at the Bell, had his leg broken by a cave on January 20, 1898.

Jerry Walton, a miner at the Mountain Con. No. 1, had his leg broken by a cave on the 1,100 foot level, Jan. 28, 1898.

Eugene Pence, a miner, by a cave on the 1,100 foot level of the Mountain Con. received internal injuries on January 28, 1898.

Dan O'Rourke, a miner at the Bell mine, had his leg broken by a cave on February 4, 1898, on the tenth floor, 1,300 foot level.

Pat Hannifan, a miner at the Diamond, received internal injuries by a cave on February 26, 1898, at the 1,200 level.

Matt Kobbe, a shoveler at the Bell, had his leg broken on the 1,400 foot level by a cave on March 2, 1898.

David Gibbons, a miner at the Never Sweat, received internal injuries by jumping off a cage in motion on March 24, 1898.

Thomas McDonald, a miner employed at the Middle of the Road mine in Deer Lodge County, had his two legs broken April 12, 1898, by falling down the shaft.

Michael Jasper, a shoveler at the Never Sweat, received injuries by falling down a chute on May 1, 1898.

Robert Thomas, a miner at the Blue Wing, had his leg broken by a cave on May 28, 1898.

Stephen Toy, a miner at the East Grey Rock, had his leg broken by a cave on May 31, 1898, on the fifth floor of the 1,300.

James B. Furay, a timberman at the Blue Jay, had his arm broken by a fall of ground on June 23, 1898, on the eighth floor of the 600.

Solomon Tallon, a miner at the Stewart, had a machine drill run through his jaw on July 12, 1898. He was riding on the cage with a lot of drills, when one of them caught on the wall plates, causing the car to tip over. The engineer felt the jar and stopped the cage.

Thos. F. Quinn, a miner at the Bell, had his two legs broken by a machine bar falling upon them on September 24, 1898, on the 1,400 level.

John Peterson, a miner at the Minah mine, near Wickes, Jefferson county, lost an eye by an explosion of powder on September 21, 1898.

Joseph Currie, a miner at the Mountain Con. No. 1, had his leg broken by a cave of ground on October 26, 1898, on the 1,600 foot level.

Wm. Henderson, George Morgan and John Kelly were terribly injured on November 15 at the Berkely shaft of the Butte & Boston by an explosion of giant powder.

